AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

In This Issue . . . Stamped Rocker Arms Reduce Costs · · · Turin Automobile Show · · · Extruding Steel Propeller Blades · · · Huge Operation for Reclaiming Army Vehicles · · · · Steps in Making Plastic Bodies

MAY 15, 1952

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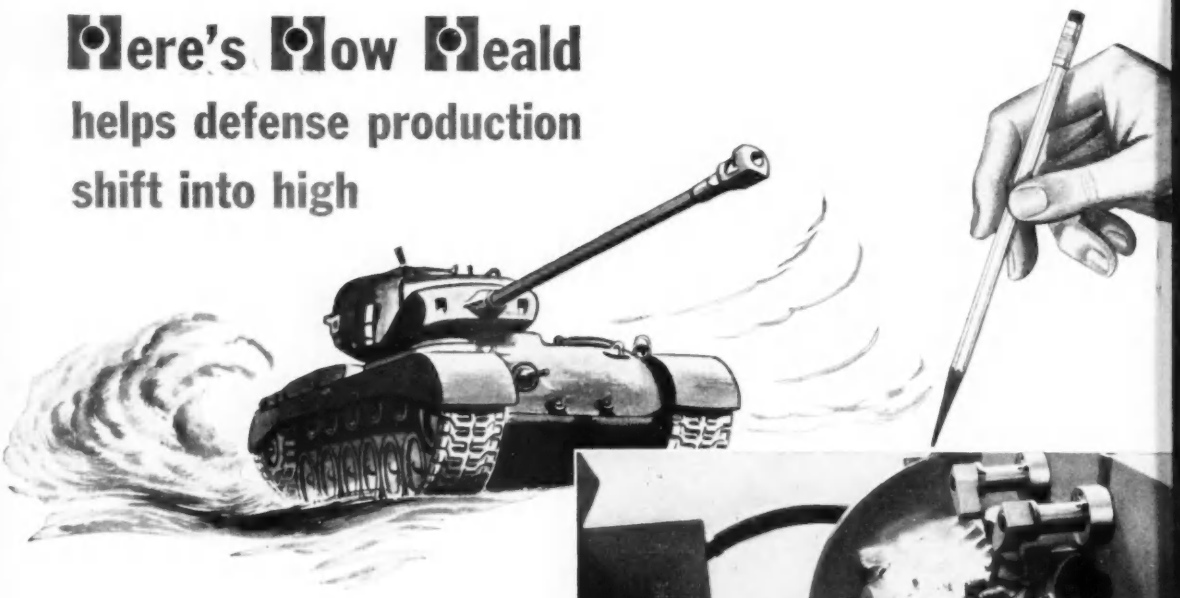
A CHILTON PUBLICATION

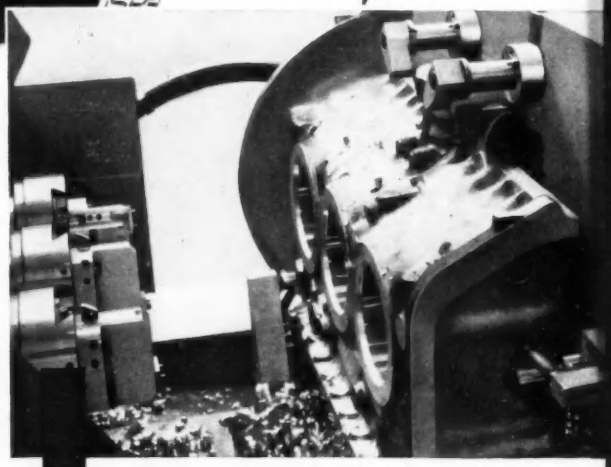
Here's How Heald helps defense production shift into high



Heald Bore-Matics speed conversion from peace work to vital military production

Tractors or tanks — automobiles or military planes — they're all the same to a Heald Bore-Matic. The versatility of these high-precision, high-production machines has done much to smooth the way for rapid conversion to defense work.

An equally important factor is the vast storehouse of precision finishing data maintained in Heald's engineering files — plus the specialized experience of Heald engineers in *every field* of borizing, internal and rotary surface grinding work. Remember — when it comes to precision finishing, it pays to come to Heald.



This Heald Model 421 Bore-Matic bores and chamfers cylinder holes in left and right halves of tank engine crankcases. The parts are held on an angle plate fixture and clamping is accomplished both hydraulically and manually.

THE STORY OF HEALD MACHINES as applied to defense production is a mighty important one to any company engaged in this type of work. This new 28-page booklet contains much valuable information on equipment, work fixtures, borizing and grinding methods. Send for your free copy of "Defense, our job today."

HEALD

Heald machines speed the nation's production

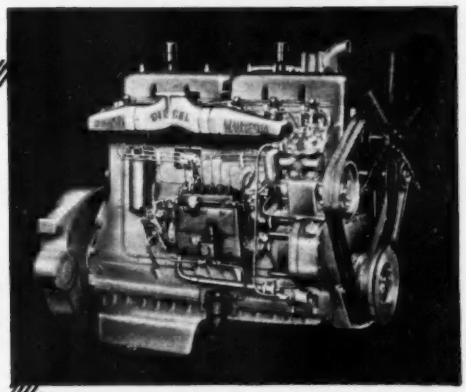
THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

WAUKESHA *Diesel*

for heavy hauls and steep grades



148-DK High Duty DIESEL — six cylinder, 5¼-in. bore x 6-in. stroke, 779 cu. in. displacement, peak hp 200.

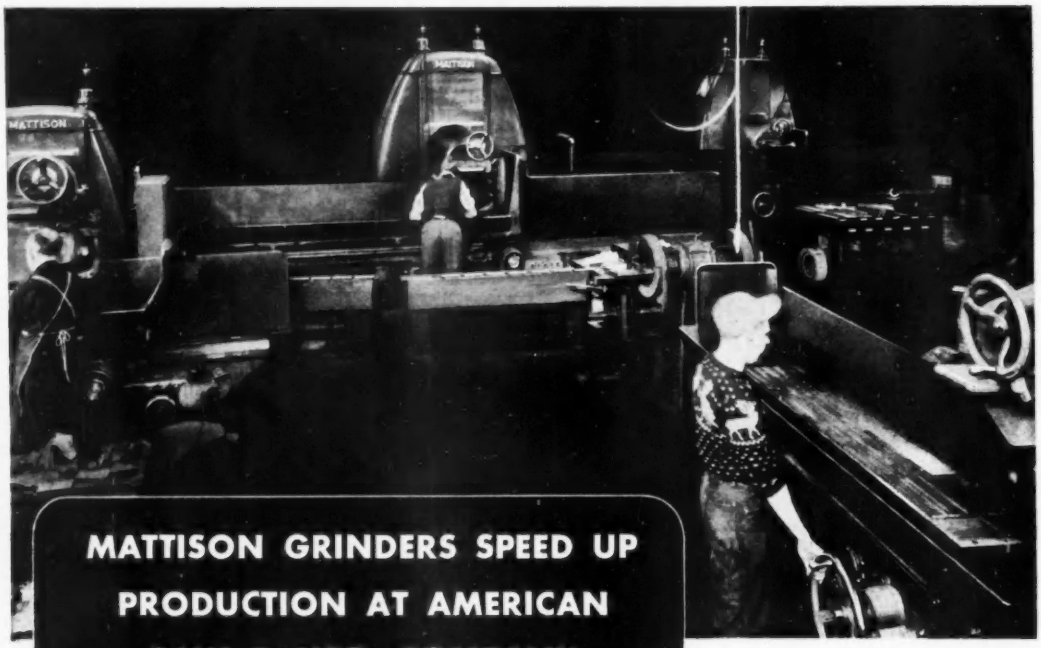
● No matter how heavy the hauling or how stiff or steep the grades—where the pay-off is on pulling payload—you make the miles with this Waukesha High-Duty Diesel.

It is designed to keep on putting out the power. And, with all its exclusive Diesel design advantages, its advanced construction and material features—it can do it.

The 7-bearing hardened crankshaft is counterbalanced; has a torsional vibration dampner. There's long life in the triple element, steel-backed, copper-lead-babbitt heavy-duty, precision bearings. Wet cylinder sleeves and overhead valves are easily serviced. Heavy-duty, aluminum alloy pistons are cooled by positive oil delivery to the chamber beneath the piston crown. "Keystone" compression rings, top ring chrome plated, are non-sticking. Valves are Stellite-faced, with Stellite inserts for intake and exhaust seats. Dual valve springs. Valve guides are removable. Oil pump is outside mounted; oil cooler built-in.

Among the many outstanding Diesel design features, the patented spherical combustion chamber is most important. With its clean burning, lively acceleration, smooth shock-free operation, high fuel economy with low maintenance—it puts the pay in payload power. Send for Bulletin 1532. 171

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN • NEW YORK • TULSA • LOS ANGELES



MATTISON GRINDERS SPEED UP PRODUCTION AT AMERICAN SAW & MFG. COMPANY

● The four Mattison High Powered Precision Surface Grinders shown above are used by American Saw & Mfg. Company for the grinding of annealed tool steel strips and bars on a real production basis in the manufacture of Lenox Precision-Master Ground Flat Stock. Exacting manufacturing specifications demand excellent finishes within close limits of accuracy.

The massive double column support, high power and rigidity of construction of the Mattison Grinder combine with accuracy and speed of operation to insure consistent precision results on a high production basis for American Saw & Mfg. Company. For complete information regarding the capabilities of the Mattison High Powered Precision Surface Grinder send for free circular.

MATTISON MACHINE WORKS

ROCKFORD • ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

May 15, 1952 Vol. 106, No. 10

Contents

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AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

AUTOMOTIVE INDUSTRIES, Vol. 106, No. 10. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, 1 year $2.00, 2 years $3.00. Canadian and Foreign $5.00 per year; single copies, 25 cents, except Statistical Issue (Mar. 15th), $1.00.

Let's Get in ALL *the* SCRAP

If you are not equipped to bale your sheet metal scrap, there are TWO WAYS you can help to assure an adequate supply of scrap metal *now* and in the years ahead:

1. FOR THE PRESENT . . .

Make arrangements with a responsible Scrap Metal Dealer who is equipped to bale your Sheet Metal Scrap and ship it to Mills, Smelters and Foundries for the *Immediate* Needs of Military and Civilian Production.

2. FOR THE FUTURE . . .

Plan *now* to *integrate your plant for the orderly*, economical and profitable reclamation of your sheet metal scrap. This can be accomplished by building your Scrap Salvaging Program around the right type and size of baling equipment.

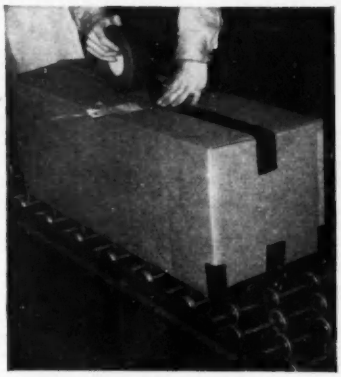
Galland-Henning offers you *competent counsel* on your Scrap Metal Baling Operations based on many years experience in the design, construction and installation of Scrap Metal Baling Presses for every industrial need.

GALLAND-HENNING MFG. CO.
2747 South 31st Street • Milwaukee 46, Wisconsin

GALLAND-HENNING
SCRAP METAL BALING PRESSES

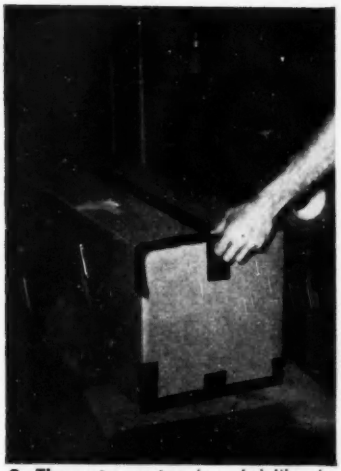
A 7126-1P

How Stewart-Warner makes ONE TAPE do the WORK OF TWO



1. A packaged South Wind heater for the Army is sealed with waterproof Polyken Tape No. 215.

2. The carton is then bagged in an aluminum foil-lined sack from which the air is removed. This bag is placed in a slightly larger carton.



3. The outer carton is sealed like the inner one with Polyken Tape No. 215.

4. Spare parts get the same government-approved treatment.

Polyken Industrial Tape Cuts Costs and Improves Gov't Spec. Packaging of South Wind Heaters

Stewart-Warner Corp. formerly used *two* different tapes to seal inner and outer cartons containing South Wind automotive and aircraft heaters for military and civilian use.

Then they switched to waterproof Polyken Tape No. 215 for *both* jobs. A follow-up check by packaging engineers revealed that the cartons were being sealed more securely, packaging costs had been reduced and the possibility of workers using the wrong tape had been eliminated.

Polyken No. 215, ideally suited for this Stewart-Warner job, is economical, waterproof, and conforms to Government Specifications JAN-P-127, Type 1 Grade B.

More than 100 other Polyken pressure-sensitive tapes are at your service, all tailor-made to save you time, money and effort. Send in coupon for free tape samples and booklet.

TAILORED TO YOUR JOB

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INDUSTRIAL TAPES

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For specifications, samples, and further information on No. 215 and other Polyken Tapes, please send me your *FREE BOOKLET*, "Tape is a Tool."

Name_____ **Title**_____

Company_____

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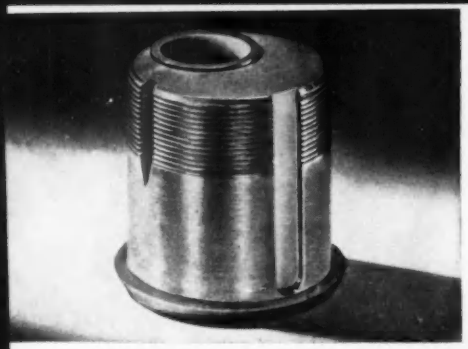
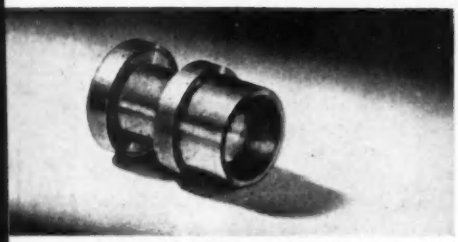
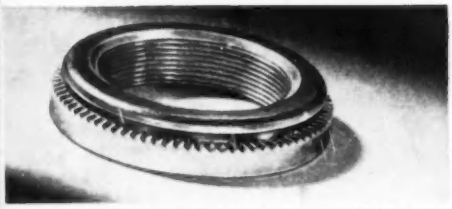


LOCK CYLINDER. Metal: 1¾" dia. brass • Machine: model 601 New Britain Gridley • Operations: *cross slide*—rough form, finish form, break down cut off, side mill, vertical end mill, final cut off; *tool slide*—face, drill offset hole, ream and counterbore offset hole, thread • Spindle Speed: 1,324 rpm • Feed: .006" per revolution • Tools: high-speed steel • Cycle Time: 7.3 seconds



CARPENTER'S PLANE PART. Metal: ⅞" B1113 steel • Machine: Brown & Sharpe Automatic Screw Machine • Operations: *front cross slide*—form; *rear cross slide*—cut off; *turret*—feed stock, spot drill, drill ½₃₂" hole, tap drill, reverse spindle and tap left-hand thread • Spindle Speed: 1,180 rpm • Feed: .0025" per revolution • Tools: high-speed steel • Cycle Time: 30 seconds



KNOB INSERT. Metal: 1⅞" round aluminum • Machine: model 61 1⅝" New Britain Gridley • Operations: *cross slide*—form, knurl, cut off; *tool slide*—spot drill, tap, ream, recess • Spindle Speed: 1,600 rpm • Feed: .005" per revolution • Tools: high-speed steel • Cycle Time: 7 seconds

SUN OIL COMPANY, Dept. AA-5.
Philadelphia 3, Pa.

I am having trouble possibly caused by an inadequate cutting oil. I would like ☐ the services of a Sun representative; ☐ the booklet "Cutting and Grinding Facts."

Name _____

Title _____

Company _____

Street _____

City _____ Zone _____ State _____

MORE THAN 300 PARTS ARE MACHINED with the aid of *one* cutting oil for tools and hardware items made by Sargent & Co. Raw materials worked are: B1113 steel, 11ST-3 aluminum, ASTM-B140-46 Type B half-hard bronze, B16-46 brass, and Type 416 stainless steel. Stock ranges from ⅛" wire to 2" bars.

SINGLE GRADE OF SUNICUT REPLACES 4 CUTTING OILS

A good example of cutting-oil economy and efficiency is provided by Sargent & Co., well-known hardware and tool manufacturers. Their complete line requires the machining of more than 300 parts from a wide range of metals. A few years ago this company was using four different cutting oils, purchased in drums. By switching to a single product, Sunicut 11W, and buying it in bulk, Sargent has been able to effect an annual saving of about $3,000. All operations are performed as well as before, or better—and shop efficiency is up.

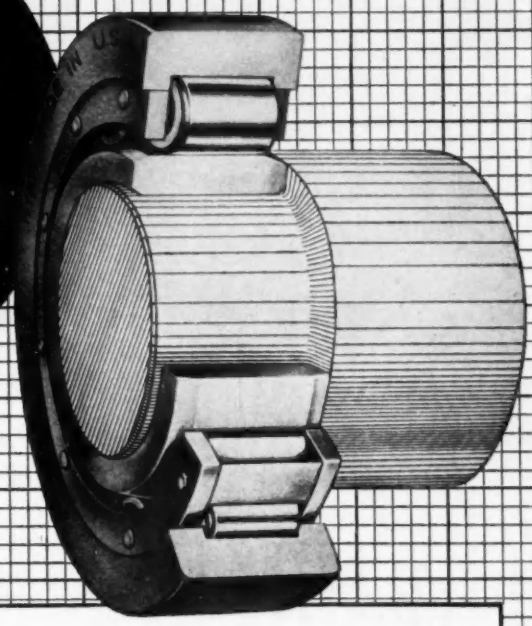
Sunicut 11W is a low-viscosity, dual-purpose cutting oil for automatics machining all nonferrous metals and free-machining steels such as B1112 or B1113. Its transparency permits quick and accurate miking. It will not stain brass or copper under normal conditions. It drains rapidly, minimizing carry-off. And its high lubricating and cooling properties aid in prolonging tool life and improving finishes. Moreover, it protects finished parts from rust and corrosion.

Other Sun cutting oils offer similar opportunities for improved operations and economy. For information about them, or the help of a Sun representative, use the coupon at the right.

SUN INDUSTRIAL PRODUCTS
SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO & MONTREAL

SUNOCO®

Heavier Press Fits with HYATT HY-LOADS



THE simplest way to mount bearing inner races is by press fitting. Hyatt Hy-Load Roller Bearings are designed and constructed to permit relatively heavy press or shrink fits of races—fits sufficient to retain races properly without resorting to auxiliary devices such as snap rings, lock nuts or keys.

This is possible because Hyatt Hy-Load races are made from carburizing type steels, carburized and heat treated to provide hard, wear resistant, case-hardened surfaces with tough ductile cores. A hard surfaced race with a ductile core permits heavier press fits than a through hardened race.

The hazards of slippage, cocking or eccentricity, always present with loose fitting races clamped endwise, are avoided when races are properly press fitted.

* * *

For more information about Hy-Loads and other types of Hyatt Roller Bearings, write Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey and Detroit, Mich.

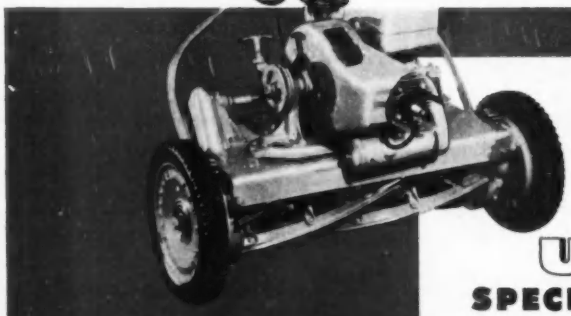
HYATT ROLLER BEARINGS

United Specialties
Plastic Oil Bath Air Cleaner

Little Cleaner —Big Job

Not much bigger than your fist, this United Oil Bath Air Cleaner does a big protection job for Jacobsen power lawn mower engines. On large-scale cutting work — park lawns, cemeteries, schoolgrounds — these mowers often operate eight hours a day, five and six days a week. Sizable quantities of dust and other debris are kicked up during mowing. With an efficient United Oil Bath Air Cleaner on the mower, over 99 percent of foreign matter is removed from air entering the carburetor.

Whatever the engine, large or small, stationary or portable, gasoline or diesel — United has an air cleaner, or can build one, to fit any internal combustion unit. Today over 260 United models protect millions of engines in every kind of operation. Our sales engineers invite your inquiry.

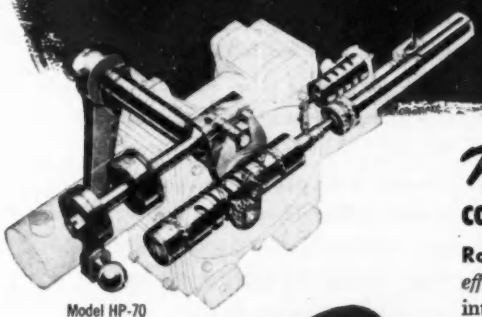


Jacobsen Lawn Queen Power Mower is equipped with United plastic air cleaner. Tough, durable plastic shell is transparent, a constant reminder to keep cleaner in top condition.

UNITED
SPECIALTIES COMPANY

United Air Cleaner Division — Chicago 28
Mitchell Division — Philadelphia 36
Birmingham 11, Alabama

Ross HYDRAULIC POWER STEERING . . . SINCE 1942



Model HP-70

Now . . . EASIER, SAFER STEERING FOR COMMERCIAL VEHICLES AND PASSENGER CARS

Ross Hydrapower . . . alert, responsive, powerful . . . gives *effortless, fatigueless* steering in a compact, completely housed, integral assembly.

Ross Hydrapower instantly prevents loss of control in soft ground, sand, snow, from tire blow-outs or road obstructions.

Ross Hydrapower steered wheels promptly return to straight-ahead driving position after turns.

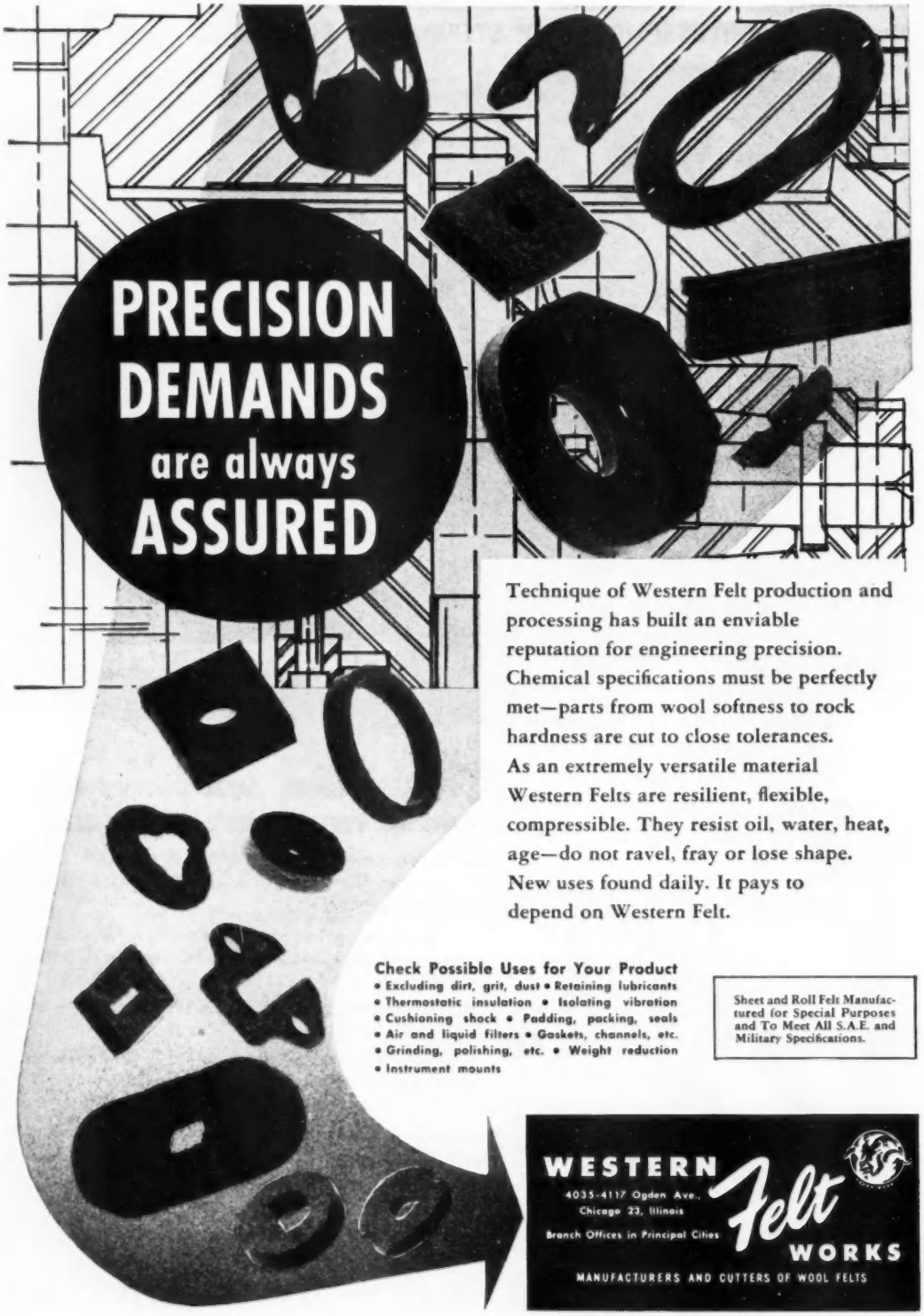
With Ross Hydrapower there is no lag in the hydraulic response either for power assistance or resisting shocks—consequently no tendency to over control.

Ross Hydrapower brings new steering *ease, safety* and *satisfaction* to commercial vehicles and passenger cars, alike. We invite discussion of any steering problem.

HYDRAPOWER Ross

Cam & Lever **STEERING**

ROSS GEAR AND TOOL COMPANY · LAFAYETTE, INDIANA



PRECISION DEMANDS are always ASSURED

Technique of Western Felt production and processing has built an enviable reputation for engineering precision. Chemical specifications must be perfectly met—parts from wool softness to rock hardness are cut to close tolerances. As an extremely versatile material Western Felts are resilient, flexible, compressible. They resist oil, water, heat, age—do not ravel, fray or lose shape. New uses found daily. It pays to depend on Western Felt.

Check Possible Uses for Your Product

- Excluding dirt, grit, dust
- Retaining lubricants
- Thermostatic insulation
- Isolating vibration
- Cushioning shock
- Padding, packing, seals
- Air and liquid filters
- Gaskets, channels, etc.
- Grinding, polishing, etc.
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- Instrument mounts

Sheet and Roll Felt Manufactured for Special Purposes and To Meet All S.A.E. and Military Specifications.

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Chicago 23, Illinois

Branch Offices in Principal Cities

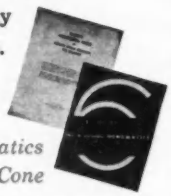
MANUFACTURERS AND CUTTERS OF WOOL FELTS

Front Side of Tooling Area
Rear Side of Tooling Area

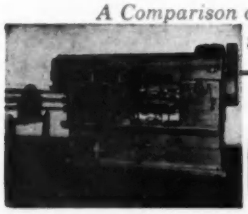
If you have a tough forming job in mind for a new "automatic," it's more satisfactory to know the recommended maximum load of the proposed machine's cross slides than to merely be told that they are *rugged.*

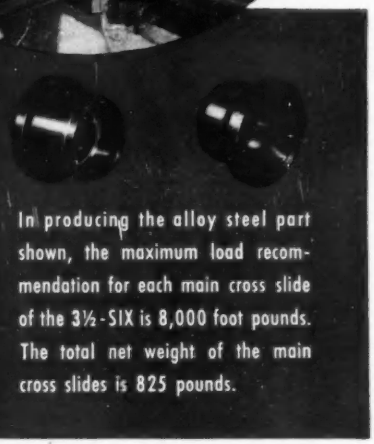
Before a machine can satisfy an important requirement it must be *built that way.* And built to figures instead of adjectives.

There are many factors involved in the building of any brand of Multiple Spindle Bar Automatic, factors on which you may want the figures. You may have the figures on CONOMATICS.



A Comparison of ALL Automatics is in Favor of Cone





In producing the alloy steel part shown, the maximum load recommendation for each main cross slide of the 3½-SIX is 8,000 foot pounds. The total net weight of the main cross slides is 825 pounds.

Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

"Walker Bulldogs"... the T-41 tanks... use Continental engines equipped with Thompson-developed "Rotocaps".

For the toughest engine duty on earth...

THOMPSON "ROTOCAPS"

What Thompson "Rotocaps" are doing for the Continental engines in T-41 "Walker Bulldog" tanks, they can do for your engines... increase the time between valve overhauls and help maintain high engine efficiency.

Thompson-pioneered "Rotocaps" and "Rotovalves" are time-tested, mileage-proved systems of rotation that

keep valve faces and stems clean

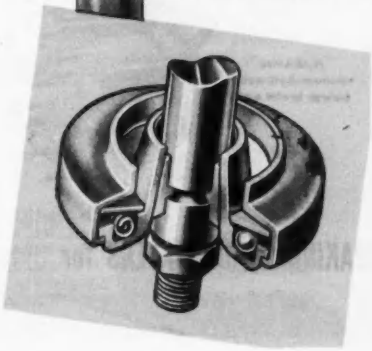
prevent stem deposits

prevent local hot spots

minimize the effects of distortion

The booklet describing both Thompson systems of valve rotation will be sent you on request.

The "Rotocap" or positive type of valve rotator shown below was developed by Thompson in 1946 ... the "Rotovalve" or release type (not shown) was developed by Thompson in 1938.



VALVE DIVISION

Thompson Products, Inc.

EUCLID, OHIO

YOU CAN COUNT ON THOMPSON FOR ENGINEERING LEADERSHIP

The Sign OF SMOOTH, SURE STOPS!

THE INDUSTRY'S FINEST POWER BRAKING SYSTEMS

More than two and a half million installations have made Hydrovac the undisputed leader in the field of power braking. And now Bendix Products offers Air-Pak, an air-hydraulic unit similar in design and principle to the Hydrovac. Air-Pak changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance.

Remember, regardless of size of vehicle or whether your preference is for vacuum or air brakes, for the industry's finest power braking systems be sure to specify Bendix® Hydrovac® or Bendix Air-Pak.

®REG. U. S. PAT. OFF.

BENDIX · PRODUCTS DIVISION · SOUTH BEND

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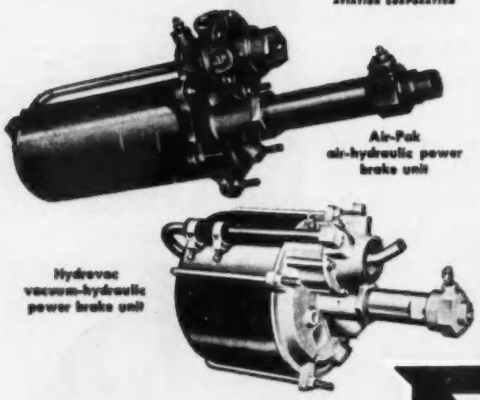
AVIATION CORPORATION



Air-Pak air-hydraulic power brake unit

Hydrovac vacuum-hydraulic power brake unit

BRAKING HEADQUARTERS for the AUTOMOTIVE INDUSTRY

Bendix Products Division

High Spots of This Issue

FOR Free Literature and Information on New Equipment and New Products, use postage-free reply card on page 65.

Reclamation of Army Vehicles

This is the story of "Operation Roll-Up," a little-known tale of how World War II equipment is reconditioned in Japan for use in Korea. An AI staff writer, who saw the program in operation, traces it step by step. Page 32.

Welding Brackets to Buick Axle Housings

When design changes prompted a decision to weld new external brackets to axle housings, two Cecil C. Peck welders, especially designed for this work, were selected for the job. Their methods of operation are described and analyzed. Page 34.

Extruding Hollow Steel Propeller Blades

Herein is a graphic picture story of production techniques referred to in a previous issue of this publication. All the fine points of the hot extrusion process used by Curtiss-Wright Corp. are shown in individual steps. Page 38.

Seven Steps in Producing a Plastic Body

A new development which is being keenly watched by the automobile industry, the plastic car body, is shown as it goes through various phases of production. Glasspar Co. makes only one size body now, but will make others. See Page 46.

Stamped Rocker Arms Reduce Costs

Already widely used on farm machinery and truck engines, stamped rockers, made by Toledo Stamping and Manufacturing Co., were recently chosen for the Willys F-head engine. Their various applications are treated here. See Page 48.

New Products Items And Other High Spots, Such As:

American cars at the Italian automobile show; the SAE national aeronautic meeting; a safe automatic press feeder which increases output; Austin assembly plant methods; jet engine parts made on huge presses; Government policies and Australian car sales; and high temperature tests on Rosslyn metal.

Automotive and Aviation News, Page 17
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RYERSON
Up-to-the-Minute Steel Service
. . . 110 Years Young
PRINCIPAL PRODUCTS
CARBON STEEL BARS—Hot rolled and cold finished
STRUCTURALS—Channels,angles,beams,etc.
PLATES—Many types: Inland 4-Way Safety Plate, etc.
SHEETS—Hot and cold rolled, many types and coatings
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ALLOYS—Hot rolled, cold finished, heat-treated . . . Standard and aircraft quality
STAINLESS—Bars, plates, sheets, tubes, etc.
REINFORCING—Bars and accessories, spirals, wire mesh
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MACHINERY & TOOLS—For every kind of metal fabrication
JOSEPH T. RYERSON & SON, INC.
RYERSON STEEL
RYERSON STEEL
110 YEARS OF SERVICE
1842-1952
RYERSON STEEL-SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI
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News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 106, No. 10 May 15, 1952

Power Steering Demand Exceeds Expectations

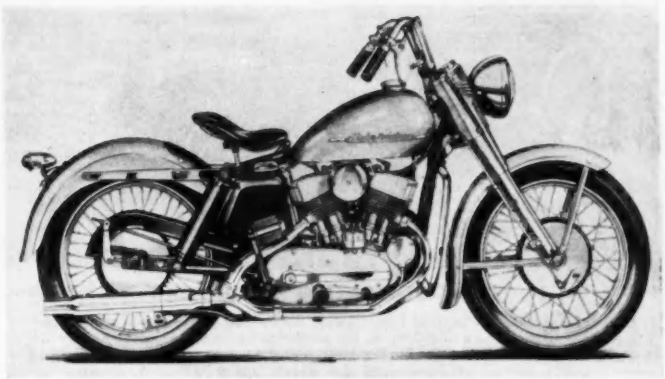
Power steering has caught on fast, and acceptance by the buying public of this optional device, costing in the neighborhood of $175, has startled even the companies that now are offering it. Both General Motors Corp. and Chrysler Corp are having a hard time keeping up with the demand, and production of the units is being expanded. Furthermore, many other companies which do not now have power steering are experimenting with it, and its use is expected to become much more widespread by next year.

Of course, it must be admitted that it is offered now only on the highest priced cars, and the cost is smaller, percentage-wise, in relation to the total cost of the car, than would be the case if it were offered on cheaper cars at present prices. However, as power steering is offered on lower priced cars, its volume undoubtedly will go up, and the price should come down. In addition, it is a very new development, and further engineering and research in both design and manufacturing processes can logically be expected to reduce the cost considerably below what it is now.

Studebaker Earnings Hold at 1951 Level

Studebaker Corp. is one automobile manufacturer reporting net income for the first quarter of this year practically on a par with the same period last year. Earnings for the first three months of 1952 totaled $4,862,149, compared with $4,931,521 in the like period a year ago. Sales totaled 67,546 cars and trucks the first three months of this year, compared with 86,108 units in the same period a year ago.

Earnings, however, were maintained because of a greater volume of defense work, plus a price adjustment on passenger cars. Studebaker expects that about 50 per cent of its sales this year will be defense items.



PRACTICAL MOTORCYCLE

Powered by a 45 cu in. side-valve, 30-hp engine, the new Harley-Davidson Model K motorcycle is said to incorporate many advanced design and engineering developments. Notable features are a four-speed transmission, deep-finned and decked cylinder heads, compensating sprocket, rear springing, and foot-shift and hand-clutch arrangement.

Convair Confirms Study of K-F Merger Plan

Floyd B. Odlum, president of Atlas Corp. and chairman of Consolidated Vultee Aircraft Corp., has confirmed that a merger between Convair and Kaiser-Frazer Corp. is under study. It is said that the decision hinges upon whether or not the study shows a good future in the automobile possibilities of K-F.

Particular attention is being given to whether or not K-F can hold or increase its percentage of the automobile market and how many cars would have to be built as a result of the merger to make automobile production possible. Another consideration is whether or not the Willow Run, Mich., plant could be used for specific types of aircraft work.

GM Sales and Earnings Fall Behind Year Ago

General Motors Corp. sales in the first quarter of this year were down 8½ per cent below the same quarter a year ago, and net earnings also declined to $127 million, compared with $141 million in the comparable 1951 quarter. Total sales in the first three months of this year were $1.793 billion, compared with $1.96 billion in the corresponding quarter of 1951.

While sales of defense products increased more than three times over the same quarter a year ago, civilian goods declined to $1.467 billion from $1.86 billion. Of particular interest is the tax provision totaling $251 million, or nearly twice the amount of net earnings during the quarter.

Sales of cars and trucks in the first quarter of this year were 10 per cent under the preceding quarter and 37 per cent below the same period last year, due to a slower market.

News of the AUTOMOTIVE

FOAM-GENERATING FIRE TRUCK

Designed and built by National Foam System, Inc., a new pumper truck with a foam-generating unit has been added to its fire protection facilities by Socony-Vacuum Oil Co. at its Olean, N. Y., refinery. The International Model L-192 truck has a chassis with a 193 in. wheelbase, dual rear wheels, and a 372 cu in. engine.

Tooling for New V-8 Engines Under Way

As a result of the much improved materials situation and the apparent return of a buyer's market, new car model work is being stepped up. Tooling for several new engines is in the works, and some of them will probably appear late this year.

The best evidence obtainable at the moment indicates that Dodge, Ford, and Mercury will have new V-8 engines in production later this year, probably for introduction on 1953 models. Buick also is reported to be well along with plans to introduce a new V-8 in at least one of its models in 1953.

Tooling has been a very difficult problem but appears now to be easing somewhat. It is pretty generally known that Pontiac, Packard, and Chevrolet also are planning new overhead-valve, V-8 engines, but these are not expected to be ready until 1954 models.

In all probability, there also will be some new bodies appearing, particularly in Chevrolet and Pontiac, which currently are in their fourth model year with the present body. Reports from tool and die shops are that work on dies for Chevrolet is being pushed heavily, and it is now believed that its 1953 models will be announced much earlier than has been customary, possibly by late summer or early fall.

Chrysler Corp. divisions also are reported to be heavily involved in styling changes. So far as can be determined, there will be no radical engine change for Plymouth, but an automatic transmission is a distinct possibility on the new models.

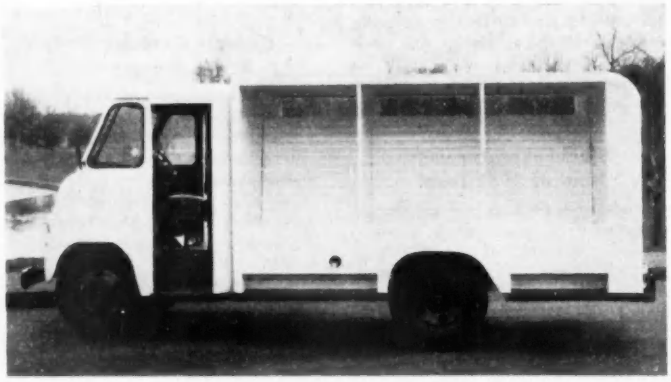
New Type of Diesel Used in British Patrol Ships

According to a recent report, British naval patrol vessels, such as torpedo boats and gunboats, will be equipped in the future with a new type of Diesel engine. Called the "Deltic" because of its triangular shape, the engine is said to be an opposed-piston, two-stroke unit with a maximum output of 2500 bhp.

ACF-Brill and Dairy Co. Merger is Approved

ACF-Brill Motors Co. recently decided upon a merger with Foremost Dairies, Inc., under the latter's name, although its financial position is now good.

According to reports, Foremost can profitably use added capital in its expansion program. In addition, it is said that the "know-how" of ACF-Brill, combined with the experience of Foremost, should make possible the development of special equipment for transporting and refrigerating dairy products and further strengthen the former's peacetime position.



PALLET BODY FOR BOTTLES

A new pallet body, built recently for soft drink bottles by Herman Body Co., is mounted on a Ford F-6 Parcel Delivery with 134-in. wheelbase and a GVW of 16,000 lb. Designed for 36 in. by 42 in. pallets, this body carries 210 cases in six 35-case pallets per load. Extra cases or empties may be carried on the depressed roof.

AND AVIATION INDUSTRIES

FLYING WORK-HORSE

The Air Force's new rescue helicopter, the YH-21 "Work-Horse", made its first flight recently at the Philadelphia, Pa., plant of Piasecki Helicopter Corp. The tandem twin-rotored transport is powered by a Wright R-1820-103 engine, has a 20-ft heated cabin, and is especially designed for cold weather missions under all types of conditions.

Ford Tank Contract Tripled by Army

Army Ordnance has more than tripled Ford Motor Co.'s contract for T-48 medium tanks to be built at the company's tank plant at Livonia, Mich., now under construction. The original contract, including tooling costs, was for $180 million, and the new supplemental order brings the total to more then $300 million.

Ford states that, despite a fire which damaged a part of the plant Feb. 23, production will be well under way before the end of the year. The plant will contain 1.463 million sq ft of manufacturing space and will employ about 6000 persons at peak schedules.

AMA Cites Increases In Vehicle Taxes

In its current issue of "Automobile Facts," the Automobile Manufacturers Association reveals statistics on the monumental increase in automobile taxes over the past twenty years. It points out that in 1930 special motor vehicle taxes amounted to $324 million, but by last year had climbed to $4.5 billion. During the same two decades, special truck taxes have climbed from $195 million to $1.3 billion.

AMA points out that Federal excise taxes on vehicles, parts, tires, fuel, and oil were imposed as an emergency measure during World War I, and except for three depression years, have continued in force at a steadily rising rate since 1932. In that year special taxes totaled $75 million and since have soared as a result of both higher rates and greater vehicle use until they totaled $1.5 billion last year.

The AMA study states that one-eighth of all tax revenue in this country comes from using, manufacturing, and selling of motor vehicles and automobile equipment. In 1950, the latest year for which data are available, such taxes accounted for $7.5 billion out of the $60.8 billion total that year.

Dodge Reduces Truck Prices

Due to a reduced use of conversion steel at penalty costs, Dodge Div. of Chrysler Corp. recently announced a downward adjustment in prices of all Dodge trucks.

Added costs of conversion steel were the basis of increases in Dodge truck ceiling prices authorized by the Office of Price Stabilization last fall and placed in effect Nov. 23, 1951. The present downward adjustment is in exactly the same amounts as those increases.

Over the entire line of Dodge trucks, the downward adjustment ranges from $15.55 to $60.00 in factory retail prices at factory, Detroit, Mich.

United Press

AMPHIBIAN MIDGET

A new and small five-seat amphibian plane, the Model P-136 Franklin, was built by the Piaggio Works, Genoa, Italy. Its two 215-hp engines give it a cruising speed of 130 mph. The plane was photographed on route to an air competition in Germany.

News of the AUTOMOTIVE

RADAR MORTAR SPOTTER

This odd-looking contraption, mounted on a trailer, is actually an efficient American radar unit pin-pointing enemy mortar fire in Korea for UN troop and aircraft action.

Motor Care Program Launched by Kem

A nation-wide packaged program to extend the service life of automobiles, trucks, engines and their parts has been launched by the newly formed Motor Life Extension Institute in cooperation with Government agencies, independent replacement parts manufacturers, jobbers, dealers, and their trade associations. Kem Manufacturing Co. is sponsoring the project.

The Institute will award membership certificates to all accredited cooperating jobbers, dealers, repair shops, and filling and service stations for conspicuous posting. This is said to be the first step of a two-pronged drive to win the support of jobbers and mechanics and to reduce obsolescence by keeping cars rolling

Registrations Keep Pace With Car Factory Sales

Recent dealer statements about slow car sales are hard to reconcile with registration and factory sales figures released by R. L. Polk & Co. and the Automobile Manufacturers Association. Polk estimates new passenger car registrations for the first quarter of this year at approximately 900,000 units.

At the same time, AMA official factory sales figures for the quarter stand at 926,601 cars for the domestic market. Preliminary figures show that March registrations should approximate 330,000, or only about 22,000 under the factory sales for the same month. AMA reports that factory sales to dealers of cars, trucks, and buses during the first quarter totaled 1,293,599 units, or 35 per cent below the first quarter figure of a year ago.

Furthermore, exports of motor vehicles, while not as high unit-wise as a year ago, were higher during the first quarter of this year than they were in any quarter since before World War II, accounting for 103,322 units or eight per cent of total factory sales.

New truck registrations are further behind factory sales than are passenger cars, according to factory sales and registration figures. Polk says that new truck registrations in the first quarter approximated 180,000 units. Factory sales to dealers in the domestic market for the same period were 261,897 units, according to AMA, or a difference of more than 80,000.

Bell Said to be Working on Combined Helicopter-Plane

Bell Aircraft Corp., working under a Defense Dept. contract, is reportedly striving to produce an aircraft with the maneuverability of a helicopter, plus the air speed and payload capacity of the conventional airplane.

The project, shrouded in secrecy, apparently is still in the basic design and mock-up stage. Reports termed the combination airplane-helicopter a "convertiplane" and described it as resembling a conventional airplane with relatively small wings and large rotor blades at each wingtip.

1952 MOTOR VEHICLE FACTORY SALES*

	Passenger Cars	Trucks	Buses	Totals 1952	Totals 1951
January	273,572	101,060	778	375,410	606,633
February	333,665	100,706	825	435,216	618,321
March	373,231	109,173	569	482,973	755,022
Total Three Months	980,668	310,939	1,972	1,293,599	1,980,176

1952 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	35,127	17,832	5,914	22,409	6,388	9,176	4,234	101,080
February	34,455	18,114	6,251	23,278	5,149	9,132	4,327	100,706
March	38,721	19,452	5,857	24,347	5,692	10,078	5,028	109,173
Total 3 Mos. 1952	108,303	55,398	18,022	70,034	17,200	28,384	13,599	310,939
Total 3 Mos. 1951	164,304	70,998	26,073	87,689	18,099	18,706	10,443	376,312

* Automobile Manufacturers Association.

AND AVIATION INDUSTRIES

Chrysler Starts Delivery of Medium Tank Engines

Chrysler Corp. has shipped its first carload of tank engines produced at the Michoud Ordnance plant at New Orleans, La., less than 11 months after rehabilitation of the former aircraft plant was started. The shipment was consigned to the Chrysler tank plant at Newark, Del., where T-48 medium tanks are to be built.

Although tooling and rehabilitation of the plant are a long way from being finished, production of the air-cooled tank engines is on schedule. Tool room machines and some temporary equipment are being used in the initial production stages, pending receipt of a large number of critical machines. More than 1100 machines already are in operation, and parts processing has been in progress for several months.

Canada Seeks New Outlets for Passenger Car Sales

Canada's market for passenger cars in New Zealand has reportedly been flattened by the Sterling Area's financial crisis. As a result of recently imposed austerity restrictions on imports, New Zealand has banned imports of automobiles not only from Canada, but from the U. S. as well.

With the New Zealand market temporarily shut and no indication of when it may be reopened, Canada is said to be scouting other markets. It appears likely that increased sales may be made to Latin-American countries to absorb at least part of the loss.

PINT-SIZED HELICOPTER

The pilot of a miniature helicopter, now under development by Army Ordnance, hands a message to a Jeep driver. The small craft reportedly can be dropped from a large plane, unpacked by two men, and put into the air in 20 minutes. The plane is reported useful for observation, evacuation of wounded, or small supply tasks.

Douglas Develops Unusual Type of Hydraulic Press

A new production tool which designers claim will help speed the output and reduce the production cost of airplanes has been announced by Douglas Aircraft Co. It is a new and smaller type of hydraulic press said to be capable of exerting up to three times the pressures currently used to form thousands of sheet metal parts used in airplane construction.

The higher pressure makes it possible to form the heavier gage metals employed in modern aircraft and has the additional advantage of reducing hand-forming by some 50 per cent, according to the company. It is reportedly suitable for shallow forming of aluminum and other sheet metals used not only in aircraft, but in other

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	February 1952	January 1952	February 1951	Two Months 1952	Two Months 1951	Per Cent Change: Feb. over January	Feb. over Feb. 1951	Two Months 1952 over 1951
1	New England	15,791	15,877	22,978	31,668	49,644	— .54	—31.28	—36.21
2	Middle Atlantic	80,988	82,132	73,188	163,100	154,427	— 2.23	—31.38	—33.24
3	South Atlantic	35,676	42,412	52,641	78,288	114,418	—15.41	—29.18	—31.56
4	East North Central	78,384	74,837	111,078	153,221	226,585	+ 4.74	—29.43	—32.38
5	East South Central	13,622	14,882	18,403	28,504	42,886	— 8.47	—25.98	—33.54
6	West North Central	28,734	32,385	47,489	61,119	92,932	—11.27	—39.49	—34.23
7	West South Central	30,459	29,535	41,580	59,994	93,577	+ 3.13	—26.75	—35.89
8	Mountain	10,060	8,955	14,636	19,015	31,247	+17.21	—31.27	—39.15
9	Pacific	31,585	30,364	50,808	61,949	97,847	+ 4.02	—37.83	—36.69
	Total—United States	298,479	301,379	430,797	596,858	903,563	— 1.96	—31.41	—33.94

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I., Vt.—Zone 2; N. J., N. Y., Pa.—Zone 3; Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4; Ill., Ind., Mich., Ohio, Wisc.—Zone 5; Ala., Ky., Miss., Tenn.—Zone 6; Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7; Ark., La., Okla., Tex.—Zone 8; Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.

News of the AUTOMOTIVE

1952 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Two Months' Totals

MAKE	February 1952	January 1952	February 1951	TWO MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	68,009	66,790	88,810	132,799	203,333	22.25	22.50
Ford	40,028	39,015	72,058	79,043	150,618	13.38	16.67
Plymouth	33,841	40,378	46,030	74,219	85,342	12.43	9.45
Buick	23,821	23,498	37,237	47,319	74,633	7.93	8.26
Pontiac	17,685	22,362	28,150	40,047	65,612	6.71	7.26
Dodge	17,236	16,367	25,333	33,603	48,804	5.63	5.40
Oldsmobile	16,588	15,831	23,195	32,397	45,864	5.43	5.05
Studebaker	15,090	14,579	17,338	30,569	36,760	5.12	4.07
Mercury	11,960	12,299	20,694	24,298	43,654	4.06	4.83
Chrysler	9,177	9,524	11,423	18,701	23,996	3.13	2.66
Nash	9,882	8,993	9,973	18,656	21,201	3.13	2.35
De Soto	6,523	6,599	9,230	13,122	19,121	2.20	2.12
Hudson	5,845	5,099	10,025	10,944	19,359	1.83	2.14
Cadillac	5,384	4,473	8,384	10,337	17,825	1.82	1.97
Packard	4,423	4,409	6,134	8,832	13,134	1.48	1.45
Kaiser	2,694	2,808	5,379	5,502	10,912	.92	1.21
Henry J	1,979	2,326	4,726	4,305	9,276	.72	1.03
Willys	2,186	1,752	2,182	3,938	4,603	.66	.51
Lincoln	1,214	942	2,417	2,156	5,227	.36	.58
Austin	386	408	268	794	722	.13	.08
MG	398	367	...	765	...	.13	...
British Ford	274	305	247	579	538	.10	.06
Hillman	250	274	...	524	...	.09	...
Crosley	247	265	488	512	1,030	.09	.11
Jaguar	177	183	...	360	...	.06	...
Allstate	138	60	...	198	...	.03	...
Miscl. Foreign	281	331	1,037	612	2,091	.10	.23
Miscl. Domestic	425	44	11	469	208	.08	.02
Total All Makes	295,479	301,379	430,797	596,858	903,563	100.00	100.00

* Based on data from R. L. Polk & Co.

1952 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Two Months' Totals

MAKE	February 1952	January 1952	February 1951	TWO MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	19,536	19,455	26,853	38,991	56,167	32.80	33.72
Ford	13,205	12,986	19,017	26,191	39,916	22.02	23.95
Dodge	7,306	7,979	8,572	15,285	19,302	12.85	11.58
International	6,680	6,880	7,681	13,530	15,812	11.37	9.49
G. M. C.	5,971	5,969	7,941	11,940	16,908	10.04	10.15
Studebaker	2,137	2,114	2,459	4,251	5,654	3.57	3.39
White	791	948	1,026	1,739	2,303	1.46	1.38
Willys Truck	795	897	1,329	1,692	3,002	1.42	1.80
Willys Jeep	594	581	710	1,175	1,394	.99	.84
Mack	528	536	1,001	1,064	2,006	.89	1.20
Diamond T	292	288	379	580	786	.49	.47
Divco	233	254	346	487	754	.41	.45
Reo	236	239	363	475	760	.40	.46
Autocar	147	142	147	289	336	.24	.20
Brockway	137	117	234	254	501	.21	.30
Pontiac	47	74	48	121	134	.10	.08
Kenworth	70	47	76	117	150	.10	.09
F. W. D.	34	76	50	110	88	.09	.05
Federal	57	52	100	109	212	.09	.13
Peterbilt	26	19	25	45	47	.04	.03
Sterling	4	29	16	33	61	.03	.04
Miscl. Domestic	245	189	180	434	307	.36	.18
Miscl. Foreign	14	20	18	34	39	.03	.02
Total All Makes	59,285	59,661	78,581	118,946	166,639	100.00	100.00

* Based on data from R. L. Polk & Co.

metalworking industries. One future application, Douglas said, will be the hot forming of titanium and magnesium.

Developed by O. A. Wheelon, production design engineer of the Douglas Santa Monica Div., the new tool is known as the Wheelon Direct Hydraulic Press. It will be manufactured and marketed, under license, by Verson Allsteel Press Co.

Car Maker Plans 200-HP Engine

The race for high horsepower ratings in passenger cars is by no means ended. One of the Big Three is reportedly planning to step up the engine of its highest priced line to 200 hp. The higher output will be obtained through changes in cam and valve design and the addition of a new type of carburetor.

Private Company to Run Detroit Tank Arsenal

The Army has definitely announced that the Detroit Tank Arsenal, which has been operated by the Ordnance Corps since the end of the war, will be turned over to private industry for operation. Selection of the company to operate the plant and the date of actual transfer have not yet been announced, however.

It is understood that Chrysler Corp. is a likely selection, since both Ford Motor Co. and General Motors Corp. are reported to have withdrawn from the bidding. Other companies considered for the job are Kaiser-Frazer Corp. and Motor Products Corp.

Thunderjet Sets MDAP Milestone

A Republic F-84 Thunderjet that was placed on the deck of an aircraft carrier recently at Port Newark, N. J., marked the 3,000,000th ton of military equipment for delivery under the Mutual Defense Assistance Program.

The fighter-bomber was part of a cargo of F-84 jets placed aboard the aircraft carrier USS Tripoli destined for the Netherlands and Belgium to bolster the strength of the North Atlantic Treaty Organization.

AND AVIATION INDUSTRIES

No General Price Cut Seen for Automobiles

The recent actions of Cadillac Motor Car Div. of General Motors Corp. and Kaiser-Frazer Corp. in reducing car prices has led to some speculation that a general price cut is in prospect. Actually, the Cadillac reduction was merely an adjustment for lower cost of conversion steel, a minor factor, and another adjustment because of an error in figuring prices. With practically a year's production sold out in advance, Cadillac certainly was under no compulsion competitively to reduce prices.

K-F's cut of from $100 to $168 on the Henry J line was frankly labeled a competitive move by the company. However, other companies have not yet given any indication that their dealers are overstocked to the extent that a price cut is necessary to move the merchandise.

Improvement Is Seen in Scrap Situation

The steel scrap situation is much improved, and current backlogs at the mills run from 25 to 45 days supply. Last winter at the lowest point some mills were actually operating with one or two days supply. Warm weather, which spurs scrap collection, is one reason for the improved situation.

The other important one is that dealers are rushing scrap to the mills because they fear a price drop. Not only is more scrap coming in, but it is of better quality. Some mills are turning down scrap of a grade that they were glad to get during the critical shortage last winter.

Army Tests Trucks in Midwest Flood

The Army has had an opportunity to test Reo 2½-ton Army trucks in underwater operation as a result of the recent Midwest floods. More than 300 of the units, which have standard deep-water fording equipment, were sent to the flood area to aid in rescue work and were run on a 24-hour-a-day basis. In original tests these trucks operated as much as 11 ft under water for as long as four hours at a time.

(*Turn to page* 166, *please*)

A VERSATILE DRILL UNIT

A cylinder head is checked as it emerges from a Footburt automatic drill at the Chicago Aircraft Engine Div. of Ford Motor Co. The machine works in tandem with a series of other special purpose tools to perform 60 separate machining, drilling and counterboring operations on the cylinder head shown here.

Two Months' Retail New Car Sales Valued at $1,200,000,000*

Price Group	February 1952 Units†	February 1952 Dollar Volume	January 1952 Units†	January 1952 Dollar Volume	Two Months Units†	Two Months Dollar Volume
Under $2,000	155,244	$276,294,951	163,710	$280,848,642	318,954	$ 556,833,593
$2,001 to $2,500	91,338	203,706,815	113,353	250,155,933	204,691	453,862,748
$2,501 to $3,500	33,605	90,607,405	17,527	52,327,507	51,132	142,934,912
Over $3,500	13,416	49,272,983	4,793	17,639,086	18,209	66,912,069
Total	293,603	$619,872,154	299,383	$600,971,168	592,986	$1,220,543,322

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.
†—New registrations of American made cars only. Does not include imported foreign cars.

1952 PASSENGER CAR PRODUCTION CHRYSLER, FORD AND GENERAL MOTORS

(As reported by the car factories)

Manufacturing Group	April 1952	March 1952	April 1951	Four Months 1952	Four Months 1951
Chrysler	11,685	10,568	16,799	43,608	57,402
De Soto	8,438	8,238	12,043	32,764	37,579
Dodge	24,726	16,920	34,694	86,318	119,445
Plymouth	46,006	36,806	65,431	157,587	241,473
Total—Chrysler Group	90,857	76,532	128,967	320,277	455,899
Ford	71,060	78,667	94,339	225,924	362,703
Lincoln	2,322	3,412	2,549	9,156	10,567
Mercury	16,883	18,742	23,501	55,017	93,491
Total—Ford Group	90,265	100,821	110,389	289,997	466,761
Buick	32,175	26,440	35,986	109,111	157,037
Cadillac	9,002	7,370	8,609	29,380	38,293
Chevrolet	88,283	72,390	98,797	298,463	433,596
Oldsmobile	22,771	18,803	25,396	77,030	110,861
Pontiac	27,238	22,303	30,304	91,935	133,120
Total—G. M. Group	179,449	147,306	199,174	605,919	872,829
Total—All Three	360,571	324,659	438,530	1,216,193	1,795,289

New Departure operates guns-and-butter plants

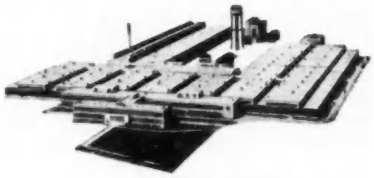
U. S. Army Photo

Ball bearings are essential to the products of our industrial might.

The ball bearings that serve millions of automobiles, trucks, tractors, farm implements, electric motors and industrial machinery are of the same materials, the same heat treatment, the same methods of precision manufacture as those required for mechanized warfare and electronic instruments. Thus conversion from one to the other at New Departure is largely a matter of changing the emphasis on types and sizes.

The productive capacities of the world's largest ball bearing factories are your assurance of the best possible production of your requirements.

New Departure's engineers and vast resources for research are freely at your disposal.



New Departure's plant at Sandusky, Ohio, where ball bearings are produced for *both* industry and the Armed Forces.

NEW DEPARTURE

Nothing Rolls Like a Ball... **BALL BEARINGS**

164

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Arma Corp.—Arthur P. Davis has been elected president.

General Motors Corp.—**John J. Cronin** has been placed in charge of the manufacturing staff, succeeding **Hugh Dean,** retired. **James E. Goodman** succeeds **Cronin** as general manager of the Fisher Body Div. **James L. Conlon,** formerly general manager of the Ternstedt Div., takes over as general manager of the Buick-Oldsmobile-Pontiac Assembly Div., while **Leo R. Schreiner** succeeds him.

General Motors Corp., Chevrolet Motor Div.—**E. H. Kelley** has been appointed general manufacturing manager, succeeding **W. J. Scott,** who has been made executive assistant in charge of manufacturing. **Edward N. Cole,** former plant manager of the Cleveland, O., tank plant of Cadillac Motor Div., succeeds **Kelley** as chief engineer. **Harold R. Boyer,** former director of the GM production engineering section, takes **Cole's** place at Cadillac.

American Cyanamid Co.—**Dr. Nolan B. Sommer** has been named supervisor of the New Product Development Dept.

Sealed Power Corp., American Hammered Automotive Replacement Div.—**Ronald F. Dusenbery** is now sales manager.

Bell Aircraft Corp.—**William G. Gisel** has been appointed comptroller.

Kortund Co.—Donald H. Vance was recently elected vice president.

Chrysler Corp., Plymouth Div.—**John P. Mansfield** has been elected president, succeeding **D. S. Eddins,** who recently retired.

Sealed Power Corp.—**Paul C. Johnson** is now president, succeeding his father, the late **Charles E. Johnson.** Other officers chosen are: **Lester G. Matthews,** vice president and treasurer; **Raymond R. Beardsley,** vice president; **Gordon E. Reynolds,** secretary and assistant treasurer; **Robert J. Mason, Jr.,** controller; and **Thomas S. Rose,** assistant secretary.

General Tire & Rubber Co.—**Howard A. Bellows** now heads replacement tire and tube sales, while **John E. Powers** is general sales manager of plastics and special products.

Yale & Towne Manufacturing Co.—Philadelphia Div. — O. S. Carliss is now director of engineering.

General Motors Corp., Brown-Lipe-Chapin Div.—**George S. Cole, Jr.,** has been promoted to manufacturing manager.

International Nickel Co. of Canada, Ltd.—**Dr. Paul Merica** has been elected president.

Motor Wheel Corp.—**M. F. Cotes** has been elected president and general manager. **C. A. Benson** is now treasurer, while **Raymond Sanger** has been chosen assistant treasurer. **Thomas J. Fagan** is now assistant secretary, while **Karl Egeler** and **Don F. Jones** are now vice presidents.

Westinghouse Electric Corp.—**W. W. Sproul, L. B. McCully,** and **H. E. Seim** were recently elected vice presidents in charge of 12 of the company's 31 various divisions.

Timken-Detroit Axle Co.—E. R. McClain has been appointed director of traffic.

Timken-Detroit Axle Co.—**Walter S. Scheel** has been promoted to chief engineer; **Lawrence G. Boughner** to assistant chief engineer, development; **Kenneth M. Koch** to assistant chief engineer, application; and **William L. Pringle** to assistant chief engineer, military.

Curtiss-Wright Corp.—**Lieut. Gen. (ret.) Levin H. Campbell, Jr.,** has been elected a director.

(*Turn to page* 186, *please*)

Necrology

V. M. Dobeus, 50, president and general manager of Tractomotive Corp., died April 8, in Chicago, Ill.

C. Laurence Warwick, 63, executive secretary of the American Society for Testing Materials, died April 23, in Philadelphia, Pa.

Walter H. Bratten, 54, manager of the Canadian Sales Div. of United States Steel Export Co., died April 22, in Winnipeg, Canada.

John A. Morrissey, 58, president and founder of Chicago Rivet & Machine Co., died April 18, in River Forest, Ill.

Leslie D. Hawkridge, 60, president of Hawkridge Brothers and a director of Vulcan Tool Manufacturing Co., died April 21, in Cambridge, Mass.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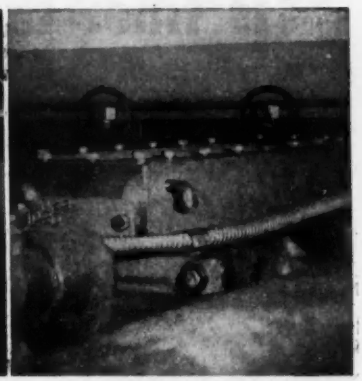
For key applications on heavy-duty equipment

ENGINE MOUNTING . . . Powerful, high torque FWD engines are securely and dependably anchored with vibration-proof Elastic Stop Nuts. The Red Elastic Collar grips bolt threads firmly, withstanding the stress and shock of the most severe operating conditions . . . damping out even the most extreme vibration.

TRANSMISSION SEAL . . . Proper lubrication of heavy-duty working parts demands a tight seal, here assured by the application of Elastic Stop Nuts on this FWD transmission. The famous Red Elastic Collar seals against oil seepage.



CAB MOUNTING . . . With the rugged jobs that FWD trucks tackle, their powerful frames are subjected to severe stresses. Only a tough and tested self-locking device could be expected to remain tight—that's why FWD uses Elastic Stop Nuts on cab mounting bolts.

FWD TRUCKS

Four Wheel Drive uses *Elastic Stop* nuts

Uninterrupted service and minimum maintenance are vital to the customers of the Four Wheel Drive Auto Co., makers of special heavy-duty trucks. FWD is particularly conscious of the importance of unfailing bolted connections. They are using Elastic Stop Nuts at key points throughout their line, simplifying their own assembly as well as assuring better performance for their customers.

Resilient locking collars of nylon or fiber permit multiple reuse of Elastic Stop Nuts, and these self-locking fasteners have earned Army, Navy and Air Force approval. For design information on the wide variety of sizes, types and applications of Elastic Stop Nuts, contact your local representative—or mail this handy coupon.

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Please send me the following free information on ESNA self-locking fasteners:

- ☐ AN-ESNA conversion chart
- ☐ Elastic Stop Nut Bulletin
- ☐ Rollpin bulletin and sample Rollpins
- ☐ Here is a drawing of our product. What self-locking fastener would you suggest?

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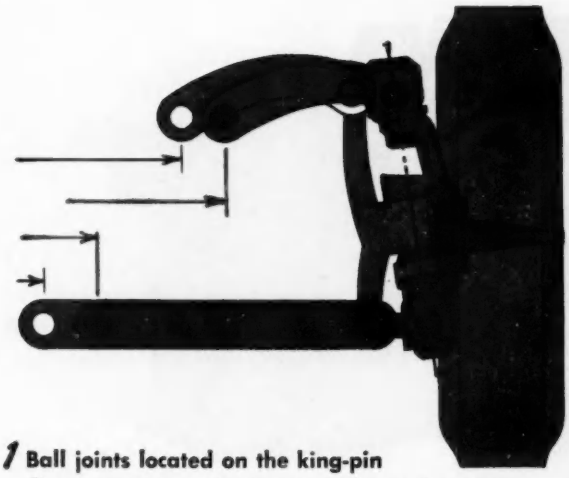
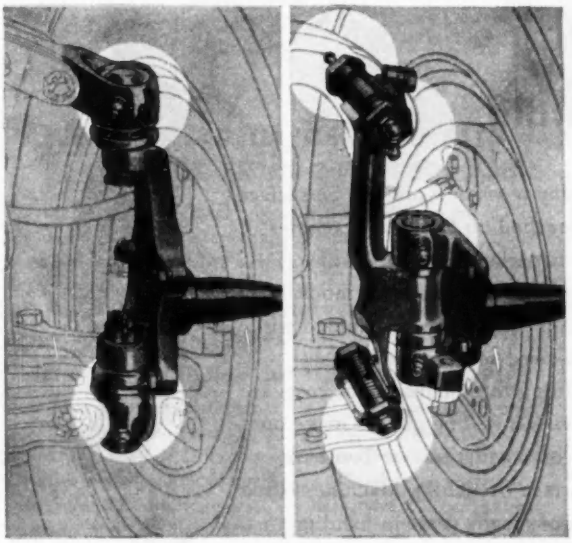
Let your nearby Black & Decker Distributor demonstrate this latest version of the most famous Drill in the electric tool industry! See for yourself how it will save you money, muscle and man-hours! See for yourself why experienced tool buyers hail it as a real champion! Or, write for full details to: THE BLACK & DECKER MFG. CO., 635 Pennsylvania Ave., Towson 4, Md.



Ball Joint Suspension

1 Ball joints located on the king-pin line move inner pivots outward, creating extra inches under the hood for wider engine design.



2 Lubrication points are reduced from 12 to 4 by eliminating upper and lower standard threaded bearings, knuckle support, king-pin and its bushings.

1 GIVES MORE SPACE FOR WIDER ENGINES

2 REDUCES LUBRICATION SERVICE 75 PER CENT

ONE GLANCE at the illustrations and you see how valuable inches are saved under the hood! Quick comparison points out the number of lubrication services eliminated. But these are only small points in the over-all story.

Thompson's Ball Joint Suspension also eliminates front suspension bind. It improves steering; makes handling easier; and prolongs service life. Through weight savings, parts reduction and compact design, Ball Joint Suspension speeds assembly. And in servicing, the equivalent of a complete rebushing job can be done in half an hour because removal of front wheels and bushings, bleeding the braking system and normal realignment are unnecessary.

Let Thompson's "ENGINEERED STEERING" experts help you solve your steering problems. Inquiries from all automotive makers are welcome at Thompson's Detroit Division. Call us at WA 1-5010.

Center Bearing Hanger for trucks—another Thompson development.

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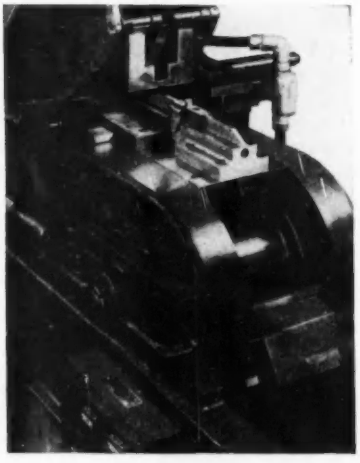
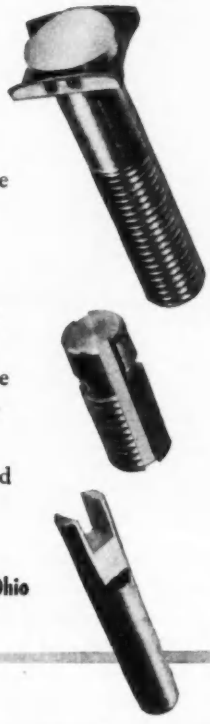
machine faster with continuous broaching



• Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.



Many types of work can be surface broached on Footburt machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Cutting tool maintenance costs are low. We will be glad to make our recommendations on Footburt Surface Broaching Machines based on our many years in handling similar work.

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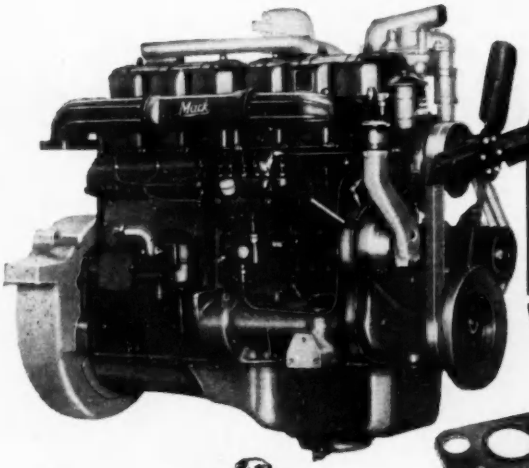
machine tools



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Mack TRUCKS

PATENTED HEAD GASKET PROTECTS MACK ENGINE PERFORMANCE

A feature of Mack diesel engine-head sealing is the use of highly compressible Victoprene grommets retained by bond to an inner steel member at water holes in the gasket. Combined with special heavy-duty metal-asbestos construction, this feature insures equally efficient and dependable sealing of coolant or lubricant openings and combustion chambers.

Victor Gives Sealing Satisfaction Since 1909

Mack's exacting requirements for this special gasket were ably filled by Victor. Leading in automotive sealing products development since 1909, Victor has the know-how to give effective help on special problems. Whether you write the specifications, or invite Victor's help, you get full benefit of unmatched facilities for developing, testing, and manufacturing gaskets and oil seals for all requirements.

LEAKPROOF COOLANT SEALING WITH VICTOPRENE

Designed especially for Mack diesel engines, this gasket combines heavy-duty sealing of combustion chambers with durable, leakproof sealing of water ways which are outside the line of studs. Grommets of Victoprene, a Victor-developed synthetic rubber, are molded-in and chemically bonded to a metal retaining member at water openings. Unaffected by engine temperatures, Victoprene is highly efficient in retaining hard-to-hold anti-freeze solutions.

For maximum resistance to blowout, breakdown, and corrosion, gasket construction utilizes Victor-milled long fiber asbestos filler, with copper case top and bottom, reinforced with steel at combustion chamber openings.

Where can we help you get better sealing?

Victor Manufacturing & Gasket Co., *and its affiliate*, Victor Sealing Products Co., Inc., P. O. Box 1333, Chicago 90, Ill.

VICTOR GASKETS AND OIL SEALS — SEALING PRODUCTS THROUGH RESEARCH

VICTOR

"ORIGINAL EQUIPMENT"

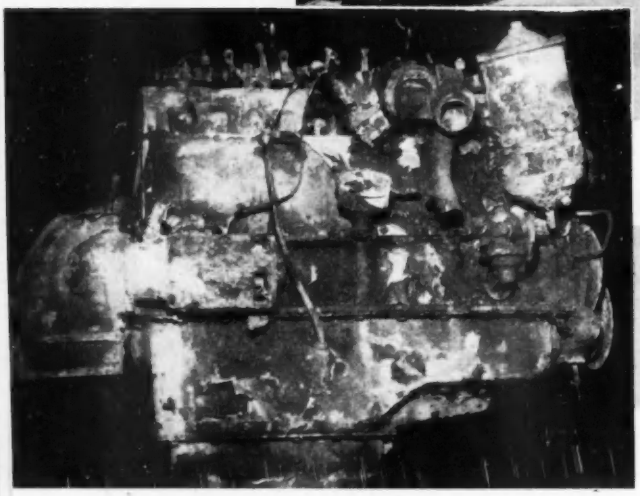
Gaskets and Oil Seals

SEALING PRODUCTS EXCLUSIVELY

Army Vehicles Reclaimed

These vehicles (at right) were rebuilt at the Oppama Ordnance project, and are ready for issue to various services. U. S. Army photo.

Below is an engine as received before cleaning and repair operations have been started. U. S. Army photo.



By

Leonard Westrate

ONE of the most dramatic developments incident to the current Korean war has been "Operation Roll-up," about which very little has been told to the American public, although in recent months there has been some mention of the operation.

In its simplest terms, Operation Roll-up consists of the salvaging of uncounted thousands of tons of World War II supplies and equipment left to rot on Pacific island outposts after the great and hasty demobilization following World War II. Value of the roll-up operation to the United States is incalculable from four major standpoints. First, it is extremely doubtful that this country could have launched a successful operation in Korea had it not been for the vehicles already rebuilt and the rebuilding facilities available to carry the load. At the outbreak of hostilities enough equipment was on hand in Japan to support an initial military operation and the tempo of rebuild and supply at ordnance bases there was stepped up to meet the need. About 80 per cent of the general purpose and combat vehicles, and nearly 40 per cent of the tanks used in the campaign came from depots in Japan.

Dollar savings of course are obvious and tremendous. It is estimated that the cost of all equipment salvaged would total about $2 billion and, after subtracting the cost of the roll-up and rebuild operation, would result in savings of between $700 and $800 million. In addition there is a third, very important factor; namely, that if the identical equipment had to be replaced at present prices, it would cost two to three times as much as the original new purchase

in Huge Salvage Operation

THIS article is the second in a series by the author. The first, which was devoted to testing army vehicles under Arctic conditions, was published in the April 15 issue of AUTOMOTIVE INDUSTRIES. Another article by Mr. Westrate will appear in an early issue.

Body shop at the Oppama Ordnance Depot. Bodies are straightened, welded, and built up in this shop. U. S. Army photo.

price because of inflation and generally higher manufacturing costs all along the line since the end of the war.

A fourth major factor is that if the materials to build weapons equivalent to those salvaged by Operation Roll-up had to be taken from the domestic economy, the disruption of civilian production could have been calamitous to automobile and truck output and to other civilian goods.

As an example of savings resulting from the rebuild operations, the Ordnance Corps reveals that cost of rebuild for various vehicles in comparison with new costs are as follows: ¾-ton truck, $1647.93 - $3543.00; 1½ - ton truck chassis, $1367.23-$4000; 2½ - ton truck, $1517.41-$6337; and medium tank, $5819.61-$244,073. These figures include all military and civilian supervisory costs. In addition to the above vehicles, rebuild operations include armored cars, half tracks, howitzers, machine guns, artillery and small arms, and hundreds of other items involving even such complex mechanisms as range finders.

Included in the Roll-up Operation was more than $2 million worth of machine tools, most of them new. This equipment had been shipped to the Philippines prior to the outbreak of the war, in preparation for a large ordnance manufacturing operation there. Much

(*Turn to page 76, please*)

New Machines Weld Brackets

Fig. 1, below—Closeup of the submerged "three-o'clock" arc welding of a sway bar bracket to a Buick axle housing. The bracket is hidden below the axle but bracket edges are air clamped against the tube along the edges of fixture plates that hold the flux.

Fig. 2, below—Same setup shown in Fig. 1 as seen from back of the Peck welder. Two Lincoln automatic heads are traversed along ways on the square section beam above the workpiece.

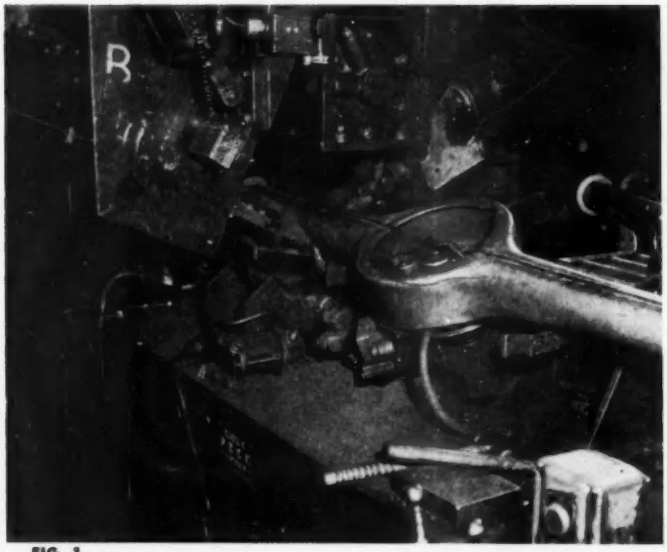


FIG. 1

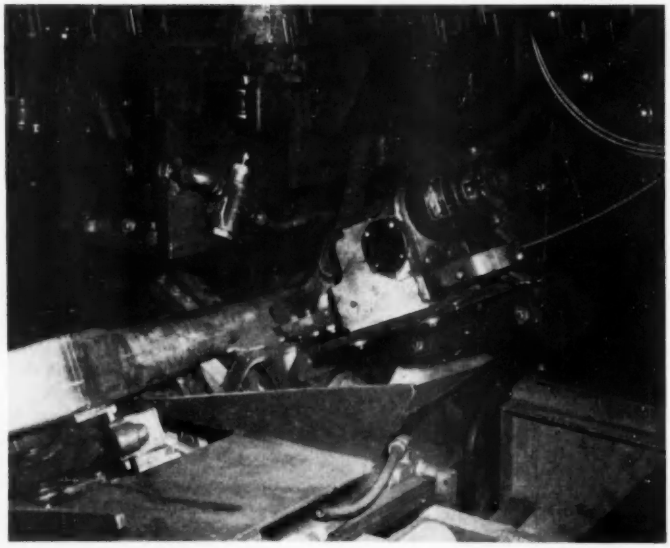


FIG. 2

FOR many years, Buick banjo type rear axle housings have been welded structures to which some external parts were projection welded. This year, certain changes in design were made and it was decided that the new external brackets, two of which serve as bumper supports and one as a sway bar anchor, should be arc welded to insure stronger joints. Welding is done in the Buick Motor Division plant, Flint, Mich., on two new Cecil C. Peck welders designed especially for these jobs under Buick specifications.

Axle housings that reach the first of these machines, Figs. 1 and 2, are first air clamped in a fixture above a bracket of somewhat A-shape form. This bracket has its open base end upward so that the edges of the ¼-in. steel plate from which the bracket is formed straddle the axle tube and lie parallel to its axis about midway between the banjo and one end flange.

When thus clamped, the edges of the bracket are on opposite sides of the tube diameter. Next to one edge, and visible in Fig. 1, is an inclined plate or shelf which is a part of the fixture. One edge of this plate bears against the side of the bracket and is flush with its edge. There is a similar plate or shelf at the opposite side, as shown in Fig. 2, but this plate is movable and is drawn back when loading but is rocked toward the axle axis when air clamping takes place. It presses against the bracket leg on its side, being flush with the bracket edge to be welded.

at Buick Plant to Axle Housings

By S. M. Spice

Welding Engineer, Buick Motor Division, General Motors Corp.

These two shelves help to hold the flux that feeds out of the two automatic Lincolnweld heads just before the arc is struck and during the welding to submerge the arc, which thus remains hidden. Both electrodes are of ⅛-in. wire and feed automatically from reels as welding proceeds and the two heads are traversed along the edges of the bracket over a distance of about four in.

Electrodes are inclined between vertical and horizontal and are set about 120 deg apart, making what are sometimes called "three-o'clock" welds. Actually, each electrode approximately bisects the angle formed by the shelf and tube wall, so that the arcs deposit metal at the bottom of V-shape troughs formed by the end faces of the brackets and the tube. This Vee catches plenty of flux to submerge the arcs but some of the flux does fall off the ends of the two shelves.

Both heads are traversed horizontally along ways supported by a box-like beam after electrodes are fed in to strike the arc. When the welds are completed and current is shut off, the heads continue their traverse as the electrodes are wiped over fixed wire brushes to remove any flux that has adhered to them. After passing the brushes, the heads trip limit switches and their motion stops.

Upon completion of the welds, the axle is unlocked automatically and is removed by hand after the locking elements have retracted. As this occurs and the axle is taken out, excess flux not adhering to the welds drops into a hopper below and falls onto a conveyor that returns the flux to the hopper above the heads for refeeding.

All motions of the heads and clamping mechanism are automatic and precisely timed. The operator inserts the bracket and the axle housing, presses a button to start the cycle, removes the weldment when the cycle is completed, and knocks off adhering flux. In this setup, about 75 pairs of welds per hour are made. Axle housings reach the machine on a conveyor and brackets are taken from a chute or tote box close at hand. Excellent welds result. Weldments are laid on a short roller conveyor along which they are moved to the next welder.

In the latter, Fig. 3, two small stamped bumper support brackets are welded to the housing, one near each end. For this job, the axle housing is put in place by hand, brackets are set in position, and air clamping follows as before, but faces of the banjo are vertical in this setup. Air clamping is done at each end as well as inside the banjo, and the axle rests in supports that are below the points where the brackets are clamped against the axle tubes. Supports and clamps are parts of a trunnioned fixture shown in Fig. 4.

(*Continued on next page*)

Fig. 3, below—General view of the four-head Peck arc welder that welds a bumper bracket near each end of an axle housing. Heads are shown elevated before rocking into welding position. Above the machine are flux elevators and hoppers. Axles are supplied on the conveyor at the left and brackets from the chute, right foreground.

FIG. 3

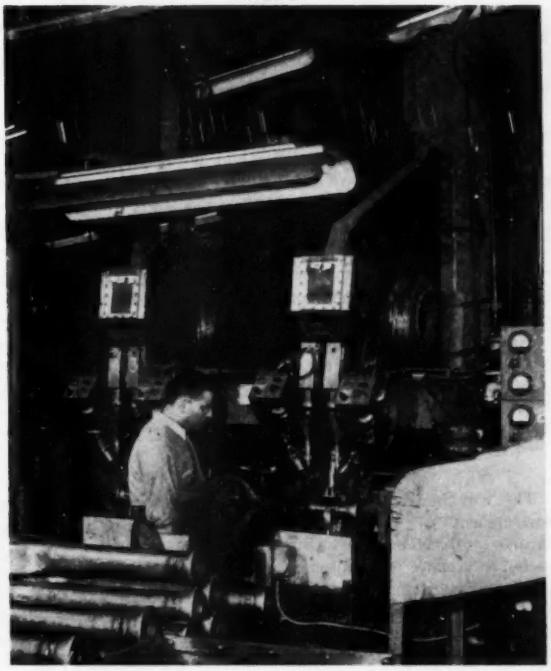
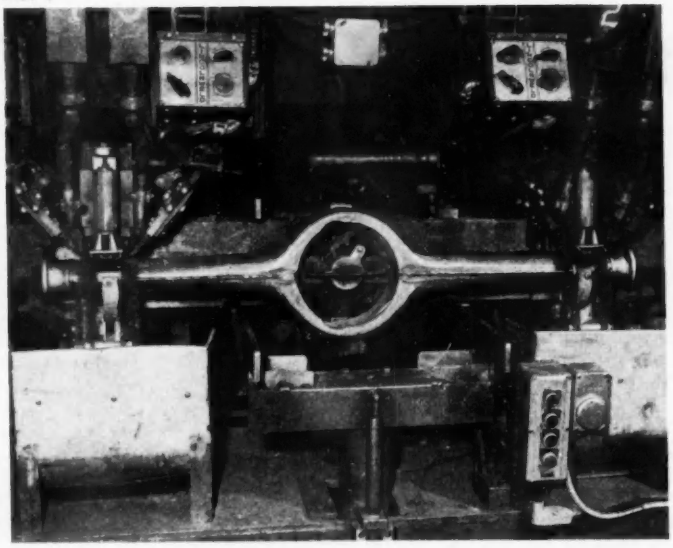


Fig. 4, below—Closeup of the machine shown in Fig. 3 welding two bumper brackets to a housing with four Lincoln automatic heads in operation simultaneously and flux feeding to submerge arcs. Clamping and other parts of the racking fixture are shown, as is also the cradle to elevate the weldment to conveyor level after completion.

FIG. 4



In this setup the welds are made through arcs that run part way around the axle tube, rather than parallel to the tube axis as before, hence the axle housing is rocked in fixture trunnions as the welding proceeds. As one weld is made at each side of each bracket, there are four separate welds per cycle and four Lincolnweld heads are employed. Electrode wire in each is of ⅛-in. diameter and projects toward the joint at an angle of about 45 deg with the horizontal housing axis, hence "three-o'clock" welds are made in this as in the prior setup.

In this instance, however, the heads remain fixed while welding proceeds, but rocking of the housing through about 90 deg moves the work relative to the electrodes. Streams of flux fall onto the housing and submerge the arcs as the welds are made. Flux drops into wells below and thence onto conveyors that elevate and deposit the unused flux in two hoppers, each of which supplies two welding heads, as shown in Fig. 3. Some flux adheres to welds, of course, but most of it is jarred loose by a vibrator attached to the fixture and any remainder drops off when the weldment is completed, unlocked and removed.

Although heads remain fixed while welds are made, all four heads are first rocked into position automatically and again rock outward when welds are completed so as to be out of the way when unloading and reloading take place. In so rocking the ends of the electrodes, with current shut off, wipe across fixed wire brushes to remove any flux that may adhere. If this were not done, the flux might interfere with striking the arcs when electrodes are moved into welding position.

All four welds are made simultaneously, each arc drawing 400-430 amp at 30 volts, supplied by Lincolnweld generators located in a balcony near the machine.

When welds are completed, heads retract, the fixture rocks back so that the banjo is horizontal and the weldment is unlocked. After this a cradle, shown clearly in Fig. 4 and supported on an air plunger below the axle housing, is elevated, lifting the housing until it is level with a conveyor back of the machine. This enables the operator to push or roll the housing onto the conveyor without lifting it and leaves the machine ready for reloading.

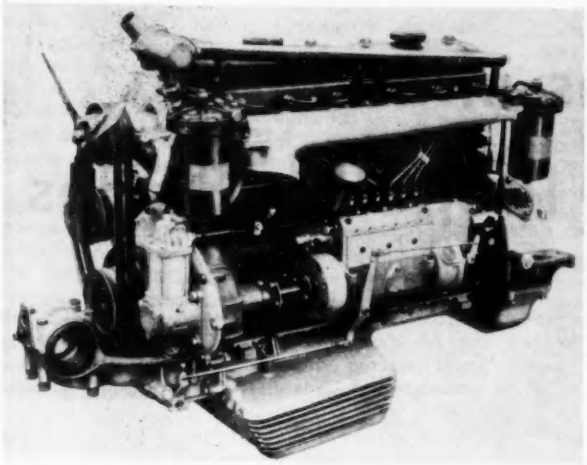
With this setup, sets of four welds per housing are made on about 75 axles per hour. All the operator does is to load and unload the fixture, press a start button and see that the welding proceeds as indicated. Locking, motion of heads, welding, unlocking and elevation of the work proceed automatically in proper sequence and timing, and only in rare instances do imperfect welds result, hence Buick welding engineers are well satisfied with the results secured.

● ● ●

Montana Chrome Deposits Will be Reactivated

The way has been paved for the development of large deposits of chrome ore in Montana which are expected to produce 900,000 tons of concentrates over an eight-year period. Under a recent arrangement with the Government, American Chrome Co. will shortly resume development of the property by completing facilities started 10 years ago but abandoned.

A working capital of $950,000 will be put up by the company against a like amount advanced by the Government, to be paid back at four per cent interest in chrome ore at a guaranteed price of $34.97 a ton for 38 per cent chromic oxide. In addition, the Government, through the Defense Materials Procurement Administration, will supply up to $1.815 million worth of equipment on a loan basis.



Fiat's new 92-hp Diesel engine.

American Cars Dominate Italy's Automobile Show

TURIN, ITALY

ITALY'S 34th automobile show was inaugurated at Turin by President of the Republic Einaudi with more than 400 exhibitors occupying an area of 200,000 sq ft. Eight nations took part, the United States dominating in the passenger car section with 20 makes, Great Britain with 17, Italy with 10, Germany with seven, and France with four. The show included all types of vehicles and every branch of the industry. A hilly test track was provided close to the exhibition grounds, for demonstrations to prospective buyers.

By W. F. Bradley
Special European Correspondent for AUTOMOTIVE INDUSTRIES

Fiat's novelty was the V-eight two-passenger sports sedan, first shown at Geneva (see AUTOMOTIVE INDUSTRIES, May 1), and also a new truck. Special emphasis is placed by Fiat on this 642 N five-ton truck, powered by a new six-cylinder Diesel engine of 92 hp. This valve-in-head unit, with three-point attachment to frame, has all accessories on the left side, the air-intake only being on the right. It has a deep-finned aluminum oil pan and a belt-driven water pump on the front end of the cylinder head. The truck has an eight - speed transmission, and can carry a useful load of five tons and haul eight tons deadweight. The same engine is used in the 642 RN 42-passenger interurban bus chassis.

Fiat 642 N truck hauling loaded trailer.

The 401 UM standardized city bus chassis is powered by a 140 hp Diesel engine with a fluid flywheel and electro - pneumatically operated clutch and gear shift.

Lancia displayed the Aurelia model which has had its output stepped up from 75 to 80 hp, and its height reduced by 1¾ in.

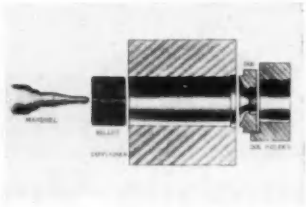
Alfa Romeo presented its 900-R for the first time in Italy, this being a two-passenger car with a load capacity of 1000 lb. Two sports models were the 1900 C and the 1900 L, with special bodies by Touring, Pinin Farina, Victoria, and Stabilimenti Farina.

O.M. exhibited the Orione 400/8, a 7½-ton truck chassis and the Orione 580/8 bus chassis. These are developments of the 400 and (*Turn to p. 162, please*)

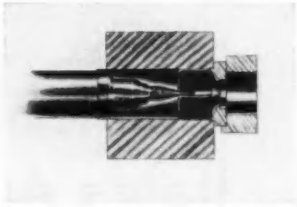
Operations in Extruding Hollow Steel Propeller Blades

DETAILS of the hot extrusion process for the production of 10-ft hollow steel propeller blades from 400-lb chrome-nickel-molybdenum steel billets have just been released by the Propeller Div. of Curtiss-Wright Corp. Developed in conjunction with the Air Material Command at the Air Force Development Center in Adrian, Mich., the basic manufacturing procedure and blade design were explained in detail

STEP 1

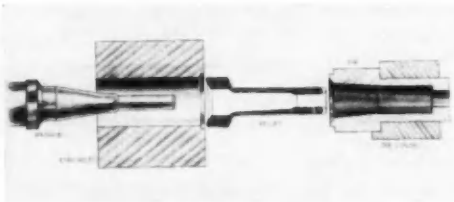


No. 1—Billet is inserted in the container.

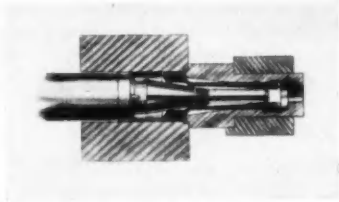


No. 2—Mandrel pushes the billet through the container.

STEP 2

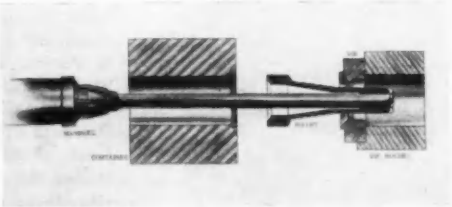


No. 1—Another tapered mandrel and die are placed in the press.

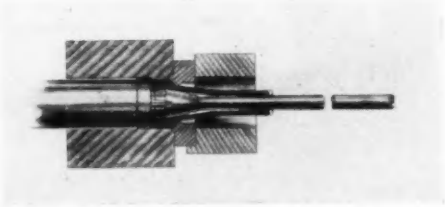


No. 2 and No. 3—The tapered transition section between

STEP 3



No. 1—Final extrusion mandrel and die are placed in the press and the reheated billet is inserted.



No. 2—External die and container are closed prior to final extrusion.

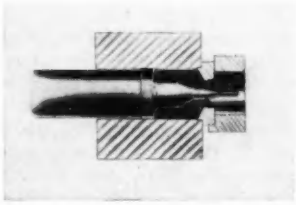
in the April 1, 1951, issue of AUTOMOTIVE INDUSTRIES.

From the basic billet to the time that the finished extrusion emerges in the form of a tapered-wall, seamless, round tube with ears or ridges running from the shank end to the tip, the workpiece has gone through three major extrusion steps. A 5500-ton Loewy hydraulic press is used for all extrusion operations.

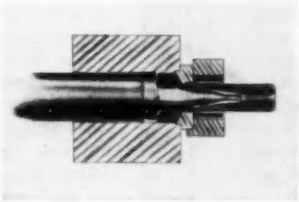
Before starting on the initial extrusion operation, the 400-lb billet is heated in a salt bath to working temperature. It is then placed in the container on the press and the mandrel pushes it through the container to the die. At this point during the first step, the billet back extrudes over the mandrel and then starts out through the die. The shank section of the blade is formed, with a tapered wall thickness, by the shape of the mandrel. After this first step, the work has uniform external diameter and tapered wall thicknesses.

For the second step, another tapered mandrel and die are placed in the press and the heated billet is reinserted. It is then pressed between the tapered mandrel and the die to form the tapered transition section between the shank and the airfoil portion of the blade. Once again the billet is removed from the press.

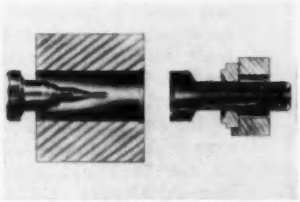
Before starting on the third and final extrusion operation, the workpiece is reheated and placed around the final extrusion mandrel and into the die. The external die and container are closed, prior to final extrusion, with the tapered mandrel inserted. At this point the hot metal is extruded between the mandrel and the die, forming a tapered wall, seamless tube. A small remnant remaining in the die cavity is trimmed off and the finished extrusion is removed for cooling and stress relieving. During the last extrusion operation, work and mandrel are supported at the blade's shank end.



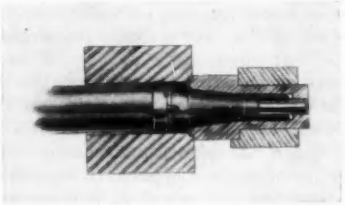
No. 3—Back extrusion takes place before the billet starts through the die.



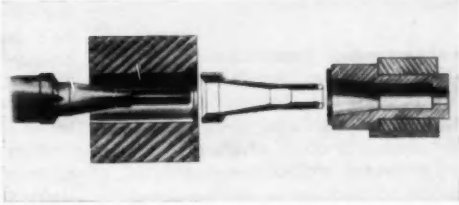
No. 4—Shape of the mandrel extrudes shank section of the blade.



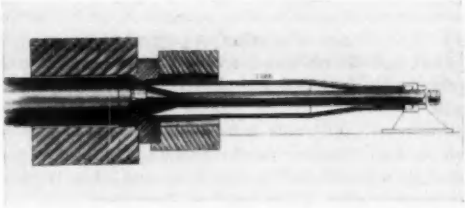
No. 5—Billet now has uniform external diameter and tapered wall thickness.



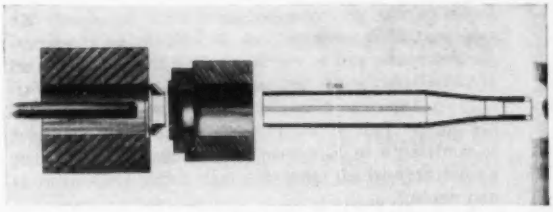
the shank and the airfoil portion of the blade is formed.



No. 4—Billet is removed from the press and reheated.



No. 3—The work is extruded between the mandrel and the die, forming a tapered-wall, seamles tube.



No. 4—Upon removal, after trimming off the remnant, the extrusion is ready for cooling and stress relieving.

SAE National Aeronautic Has International

THE First International SAE Aeronautic Meeting might well have been the title of the SAE National Aeronautic Meeting held last month in New York City. This event was sponsored by the Aircraft, Aircraft Powerplant, and Air Transport Activities of the Society. Engineers from the United States and several European countries presented papers and attended the Technical Air Review at Idlewild Airport.

Two features of the annual dinner were the presentation of the Wright Brothers Medal and an address by HRH Bernhard, The Prince of the Netherlands. Recipient of the award was O. A. Wheelon, production design engineer of Douglas Aircraft Co., who had presented in 1951 an analysis of problems involved in using titanium in airplane design and construction. (See AUTOMOTIVE INDUSTRIES, November 1, 1951.) Recently, Mr. Wheelon has developed a compact, high-pressure hydraulic press which shows promise of widespread use in airframe manufacturing and other metalworking industries.

Manufacture of American aircraft in Europe's idle factories was recommended by Prince Bernhard. He said that 6000 machine tools, 5.5 billion sq ft of production space, skilled engineers, and trained personnel are available for the job which would relieve the pressure on American manufacturing plants. This, according to the Prince, would permit European countries to contribute to European rearmament, and preserve an industry which otherwise may suffer from idleness and neglect.

Commenting that some American manufacturers might object that the European aircraft industry would be made strongly competitive with the American, Prince Bernhard pointed out that American automobiles are assembled and sold in Europe. "There is," he declared, "a place under the sun for everyone in our Atlantic Community, and it is our duty to maintain this principle and to prove it."

At the Technical Air Review, there were some 1200 engineers gathered to observe the numerous static exhibits and flight demonstrations. During this event, it was disclosed that the British Sapphire turbojet engine, known in the U. S. as the J-65 and being produced by Curtiss-Wright and Buick, has attained an added 1100 lb thrust—the thrust rating is now 8300 lb.

It was explained by W. C. Dietz of Consolidated Vultee, during the technical sessions, that possibilities for greater future comfort have developed from systems for cabin pressurization and air-conditioning designed for use in the B-36 heavy bomber. One of the problems, according to Mr. Diez, is how to take precautions against explosive decompression resulting from equipment failure with the danger that passengers might be thrown from the airplane by the escaping air. Planes so pressurized and air-conditioned will be flying at 40,000 ft and may undergo temperature changes ranging from minus 100 F to plus 100 F.

Military men pointed out at the meetings that the period of gestation for military aircraft is on the order of five years. Rear Admiral W. V. Davis, Jr., USN, reported that a new plane must undergo nine to 18 months of trial and every item of equipment similarly must be tested. Colonels J. S. Holtoner and F. J. Ascani described the USAF Flight Test Center at Edwards Air Force Base in California. This base is capable of conducting tests 350 days per year.

W. J. Kunz, Jr., Bendix Products Div., Bendix Aviation Corp., told the meeting that engine and fuel control have advanced from secondary to highly-important problems and that extensive research must be carried on to find out not only when jet powerplants are likely to stall, but the reasons therefor. He stated that compressor pressure and tail-pipe temperature continue to be reliable indices of engine operating efficiency, but warned that stalls can occur at high speeds as well as low. Stalling tendencies, he went on to say, definitely are affected by fuel flow, and some form of automatic stall detector must be developed.

A rather unique air ferry operation was discussed by Air Commodore G. J. Powell, British Silver City

Meeting Theme

Airways. He reported that the company ferries people along with their automobiles or motorcycles from England to the Continent in 22 min flight time.

Following are abstracts of two of the many papers read at this year's meeting.

O. A. Wheelon was awarded the 1951 Wright Brothers Medal by the SAE.

Continental's Gas Turbines

By Whitney Collins
Continental Aviation and Engineering Corp.

THE Continental-Turbomeca gas turbines (see AUTOMOTIVE INDUSTRIES, Jan. 1) under consideration in this paper fall generally into one of four groups; the shaft power turbine, the compressed air generator, the ducted fan, and the pure jet. Each group is closely related and derivable from the other, differing, fundamentally, only in the manner of power extraction. They all represent versions of the "simple" turbine cycle, thermodynamically speaking, consisting of a compressor unit, a combustor, and an expander unit, without such modifications as reheat, regeneration, or intercolling. They all use centrifugal compressors of about 4.0:1 pressure ratio, operate at peak cycle temperatures of about 1450 F, and use either one or two axial-flow turbine stages.

Shaft Power Turbine

With regard to design features of the Turbomeca shaft turbines, of particular interest are the extremely short annular combustion chamber and spinner-type fuel injector. Metered fuel is introduced into the turbine shaft and atomized at the periphery of the spinner by centrifugal force. Theoretical injection pressures developed by the high rotational speed of 35,000 rpm are in excess of 2500 psi. Primary combustion air is introduced in the injection area through fore and aft baffle plates. A portion of this air travels first through the hollow primary turbine stator vanes, thus adequately cooling this usually critical assembly. Combustion is completed in the confined primary zone, after which the secondary, or dilution air is introduced to reduce the gas temperature to an acceptable value before entrance into the turbine.

The compactness of the combustor arrangement permits close coupling of the compressor and turbine elements. This, in turn, permits the main bearings to be mounted outside of these elements, thus minimizing vibration and bearing cooling problems. The rear bearing is mounted in a support connected by three links to the outer combustor housing, a very stable, low temperature, structural element.

The reduction gear is of the straight-spur type, bringing the speed down in this case from 35,000 rpm. to 6000 rpm. The engine is rated at 280 hp and weighs 185 lb. Recent developments have increased this to 400 hp with a small increase in weight—approaching two hp per lb.

The performance of the engine, under standard conditions, is shown in Fig. 1. Note the specific fuel consumption of slightly under 1.00 lb per bhp-hr at maximum output, increasing at lighter loads. Fuel specific consumption, as a function of per cent rated horsepower of this engine is compared with that of a conventional piston engine in Fig. 2. This serves to emphasize a very important factor in small turbine

applications. In order to minimize the effect of high specific consumption, it is desirable that the application be one which requires a high ratio of mean to maximum power, since, at full power, the turbine fuel consumption is 60 per cent higher

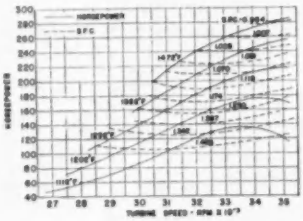


Fig. 1—This chart depicts the shaft power and fuel consumption of the Artouste I as functions of speed and turbine inlet temperature.

than the piston engine, but at 25 per cent power it is over twice as high.

It is evident that the most desirable place for the small shaft turbine is in applications where portability or high power-weight ratio is a prime requisite, and where fuel consumption is a lesser consideration.

One of the most suitable uses is in helicopters, where fixed weight is probably of greater concern than in any other device. Here, one hp will transport only about 11 lb of gross weight, and in present piston engine helicopters only four lb of useful weight is carried per hp. Any means by which this fixed weight can be reduced pays large percentage dividends in increased useful load. Since the present small reciprocating engines weigh about two lb per hp compared to 0.7 to 0.5 lb per hp with the turbine, this latter type offers a definite advantage. Furthermore, the turbine is benefited by the nature of

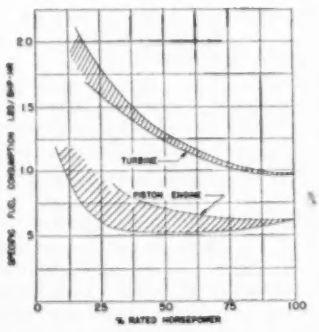


Fig. 2—A performance comparison of a small gas turbine versus a piston engine is shown in this graph.

the helicopter power demands—almost no low power operation, or in other words, a high mean-maximum power ratio. The increase in pay load, due to weight savings with the turbine power plant, is shown in Fig. 3. The downward slope of the curve results from the higher turbine fuel consumption—a break-even point being realized on trips of four to six hr.

Compressed Air Generator

Except that the net power available is used to drive a larger than normal compressor, the compressed air generator and the shaft turbine are similar. Energy is tapped at a port on the combustor housing in the form of high pressure air.

The compressed air generator in general seems to be best suited to applications where the mechanical

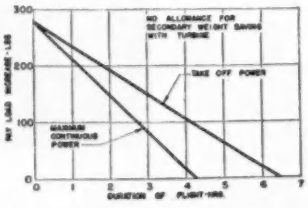


Fig. 3—Helicopter payload comparison of a shaft turbine with piston engine.

power transmission problem with a conventional engine or shaft turbine becomes particularly difficult or cumbersome. In these cases, a pneumatic link between the energy generating device and the load permits a ready solution to otherwise major problems.

Again, the helicopter, which benefits from the shaft turbine, stands to gain still more from the use of a compressed air drive to the rotor. A French-designed and built SNCASO Ariel III helicopter utilizes such a design. Air compressed by the turbine, in this case a Turbomeca shaft turbine driving a separate compressor, is ducted up through the rotor blades, where fuel is burned and ejected tangentially at the rotor tips as a high velocity jet. The result is about a 40-per cent increase in useful load over a piston engine mechanical drive system for periods of time up to 1½ to two hr.

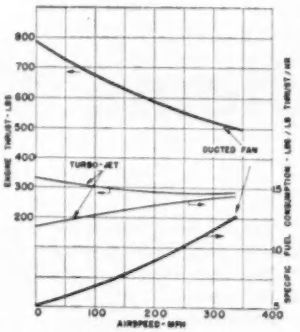


Fig. 4—Performance comparison of a straight jet versus a ducted fan engine.

Another important and highly suitable application for the compressed air generator is to furnish pneumatic power to an air bleed turbine for cranking large military jet engines up to idle speeds. This starting power requirement on some engines ranges from 150 to 200 hp.

Ducted Fan Engine

Although generally regarded as a jet machine, the ducted-fan engine is very closely related to the shaft turbine.

Due to the fact that the available energy from this unit is delivered as a high mass flow, low velocity jet, in contrast to the low mass, high velocity flow in the straight turbojet, the thrust developed per lb of fuel is about twice that of the latter machine under static conditions and at low air speeds. Fig. 4 shows an actual

(*Turn to page* 87, *please*)

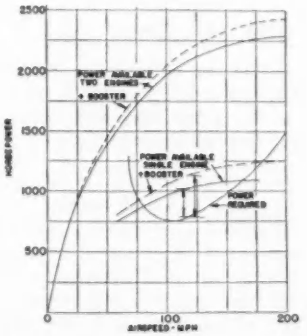


Fig. 5—Effect of a jet booster unit on typical transport airplane performance.

Automatic Press Feeder Increases Output and Eliminates Hazards

FIRST production installation of a unique, automatic press feeder has been made by United Specialties Co., Chicago, Ill., for mechanizing the stamping of air cleaner center tubes. This deep-drawn stamping is produced in a series of operations in five presses, served by four press feeders, as shown partially in Fig. 1.

The "Lodac" press feeder, manufactured by Magnaflux Corp., is a self-contained cabinet operating a pair of mechanical hands which are located on right-angle arms. It is shown in closeup in Fig. 2. This unit was first exhibited at the National Metal Show in Detroit last fall, more recently at the ASTE Exhibition in Chicago.

Cycling of the mechanical arms and control of the grasping fingers is achieved by means of a mechanical camshaft drive within the cabinet. In addition, the Lodac contains an electronic memory circuit, essential to safe automatc operation of the press. Its function is to stop the cycling of an individual press in the line-up under certain conditions. Specifically, if the loading fingers do not pick up a piece of work—for any reason—and, consequently, do not load the press die, the cycle is uninterrupted since the momentary situation cannot cause trouble. However, if the loading fingers actually load a piece in the die but the work is not ejected, the Lodac will stop the press and cycling of the fingers. In this instance, the memory circuit takes over because the fingers on the left hand failed to pick up the work. Obviously, this may be due to a variety of conditions, such a breakage of the stamping or jamming of the die, but in any event it is important to stop press action to prevent serious damage.

As shown in Fig. 1, United Specialties has provided fully automatic operation of a line of five presses by the introduction of four Lodac cabinets. Feeding of the first press in the line, however, is done manually for the time being. Transfer of work between the cabinets is handled automatically by means of individually driven belt conveyors.

In operation, the mechanical hand at the right in each Lodac unit picks a stamping off the conveyor and loads it into the press die. Meanwhile, the left hand removes a stamping from the die and deposits it at the

(*Turn to page* 110, *please*)

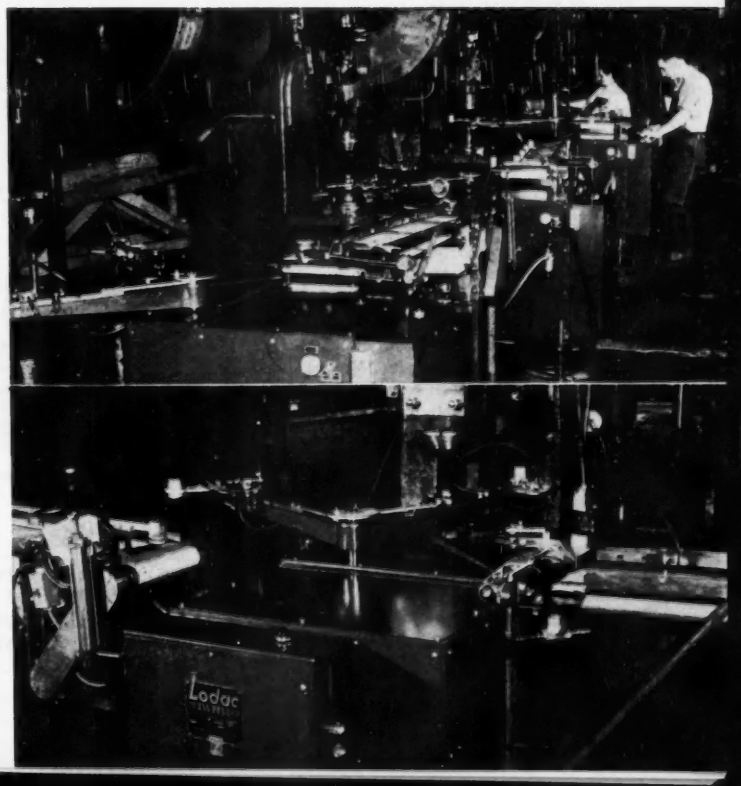


Fig. I

Partial view of a battery of five mechanical presses made fully automatic in operation by means of four Lodac press feeders, connected by self-contained belt conveyors. The Lodac in the center is fitted with a turnover fixture.

Fig. II

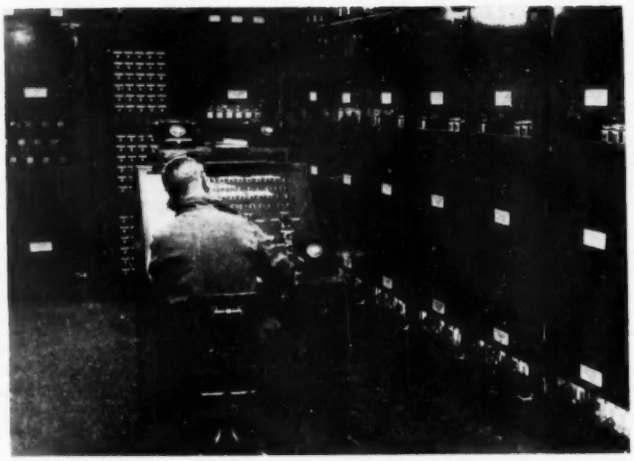
Closeup of Lodac press feeder, the central unit seen in Fig. 1. This gives an intimate view of the arms and fingers of the mechanical hands. At the left is the turn-over fixture, actuated by a Schrader air cylinder. At the right is the horizontally mounted Schrader air cylinder in position for pushing a stamping within reach of the fingers at the right.

Latest Methods Employed at Austin Assembly Plant

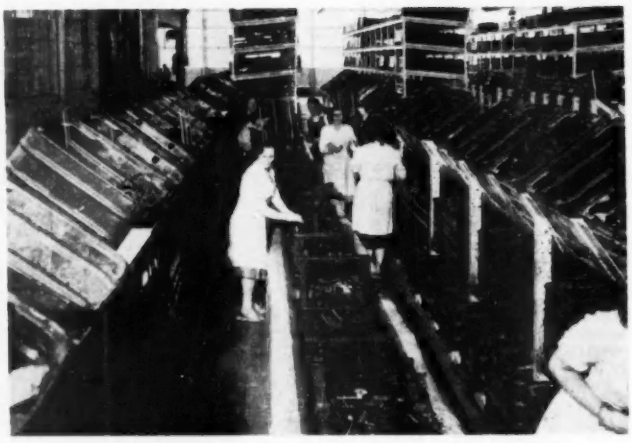
By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

BIRMINGHAM, ENGLAND

INCREASED accuracy by the reduction of the human element is the dominating feature of the new assembly plant erected by Austin of England and now in operation at the Longbridge works, near Birmingham. This assembly building is separate from the main works and is built on what was originally a hill, the top of which was removed some years ago to form an airport. A tunnel connects the main works and the assembly shop.



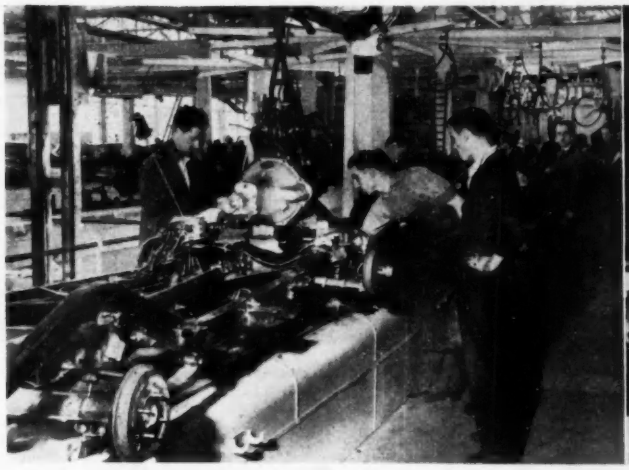
The control room is the nerve center of Austin's assembly plant.



View of the stock department where kits are made up at the start of the assembly line.

Total length of the assembly building is 900 ft. At one end there is a receiving deck with a saw-tooth side, allowing trucks to unload and move off without interfering with one another. This is followed by the stock department, and then by the 700 ft long assembly tracks. Four tracks have been laid down. One of these is for the A.40 model, and is designed to handle 2000 units of this type per week; another is for the A.70 and A.90 models; the third is for the Sheerline, and the fourth will take care of the new "Seven" at present going into production. Maximum daylight has been obtained by the use of 60,000 sq ft of glass in the roof, all of which is mounted vertically instead of in the usual saw-tooth pattern.

Parts arrive at the unloading platform in pallets, and fork trucks lift them into racks in the stock department where a two-day supply is maintained. Women operators place the required parts in unit sets on the beginning of the moving assembly tracks. The feature of the tracks is that they really consist of a series of connected jigs, on which the parts are placed in specified positions. Many of the operations are carried out automatically. The first operation is the lowering of the frame onto supports on the jig, where it has



The engine is automatically lowered into chassis frame as it aligns with mounting points.

Bodies entering tunnel from loading station.

Front springs are compressed by pneumatic cylinders for mounting of front suspension unit.

to be positioned very accurately for further processing.

First operation on the chassis is adding spring shackles. Gasoline piping, electric harness, steering gear, hand brake and clutch pedal follow. In the tunnel bringing parts from the factory there are three principal overhead conveyor systems, which come into the main assembly line at different points, the parts being brought up by elevators from the lower level and transferred to the overhead conveyors in the assembly shop. The first units are of course the frames, which are brought in from the outside frame sequence stock. Then follow the three transverse conveyor lines, the first of these handling rear axle and front suspension units, the second bringing in the engines, and the third the complete bodies.

Following the fitting of the front suspension unit, the rear axle is presented. This is brought on the conveyor in a fore-and-aft position, but is later turned 90 deg to lie across the frame. Rear springs are first attached at the front end, then trailed until they come in contact with guide rails which raise them until they are in contact with the shackles for insertion of the shackle bolts. Pneumatic rams are used to compress the front suspension springs, which are held by guide pins. The brake linkage, propeller shaft, steering arm, drag links and radius rod are followed by the shock absorbers, anti-roll bar, hydraulic tubing, brake fluid supply tank, and finally the stop light switch. At this point the engine comes in accurately from the overhead conveyor, is lowered to its brackets and bolted up, and the front end of the drive shaft is connected. Here a dummy steering column and box are added for tracking up to be carried out, for the proper steering column and box are a part of the body assembly.

At this point the completed chassis moves into the painting booth, and the jig on which it had been carried turns over and starts on its return to the head of the assembly track. Before the jig turns over, the boxes containing nuts, bolts, washers, etc., have their lids closed automatically.

The chassis are automatically lifted off the track

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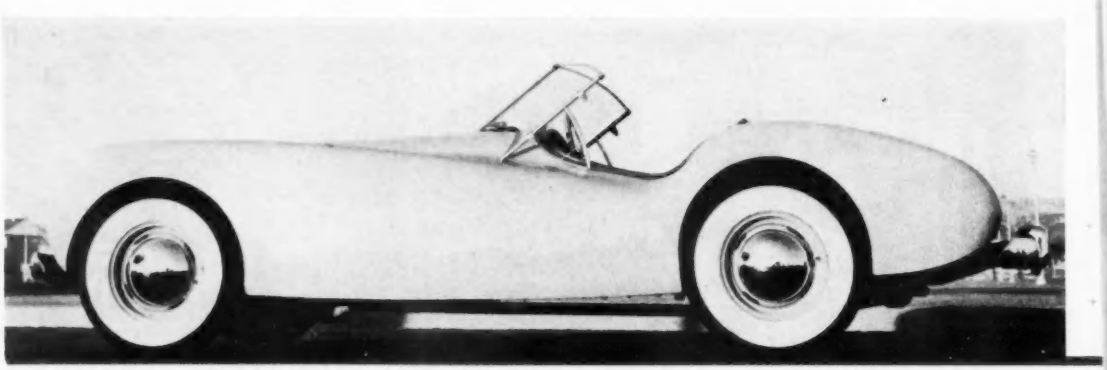
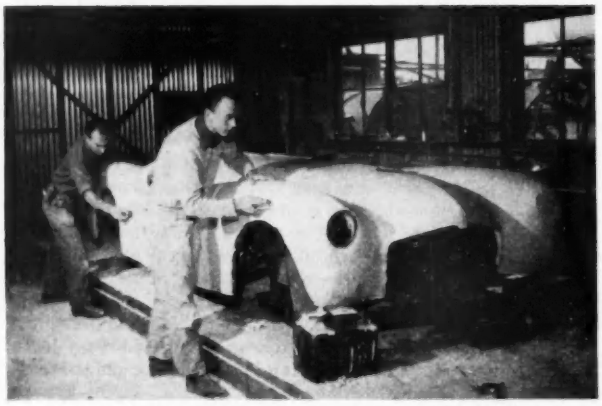


Here is the finished plastic body mounted on a 100-in. wheelbase chassis.

Seven Steps A

SHOWN here are steps in making the first low-cost plastic automobile body to go into commercial production. This rustproof, dent-proof unit is constructed of Vibrin polyester, a product of the United States Rubber Company's Naugatuck Division, and layers of glass fiber. This is said to provide a structure which, for its weight, is stronger than steel. It is approximately 65 per cent plastic and 35 per cent glass.



The initial step is to make a wood and plaster male mock-up, which gives shape and design of body. The second step is to lay up a female production mold made of same material as the final body — glass mat and cloth and Vibrin plastic.

In making the female production mold the first step is to apply a fast curing coat of Vibrin resin to the plaster mock-up over a polyvinyl acetate parting agent. This coat is needed to assure a smooth surface which is free of air bubbles or pinholes.

Applying glass fiber and plastic to mold. Vibrin resin and five layers of glass mat and glass cloth are used to build the female production mold.

All corners and edges of body are trimmed with portable light sanders. Splash pans made of the same material will be added and finally the body will be painted.

An automobile body comes away smoothly from the female production mold. Note smoothness of finish on final body (top).

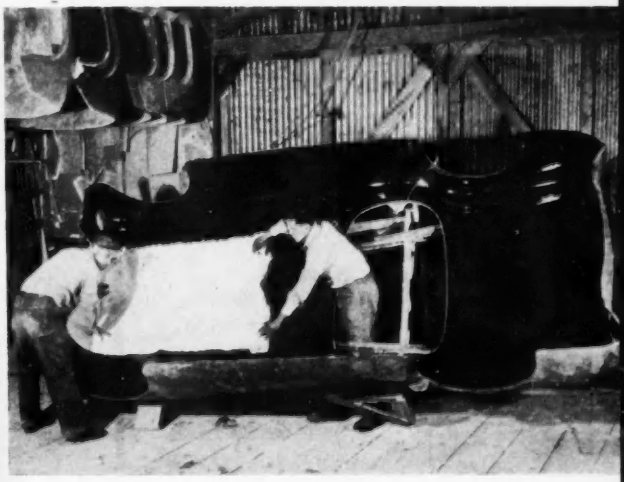
in Making PLASTIC BODY

Molded in one piece, the body is approximately 0.2 in. thick. Because of its resiliency, the Vibrin-glass combination springs back to its original shape after impact. Breaks are possible under heavy impacts, but repairs are comparatively easy and inexpensive.

The Glasspar Co. of Costa Mesa, Calif., is making the body in one design which fits a chassis with a 100-in. wheelbase. Price of the current model is $650. As production increases, Glasspar expects to make available a variety of styles and sizes to fit other chassis.

The female production mold is cut apart near driver's seat so that it can be removed from plastic mock-up. To join the two parts of mold after removal from mock-up, flanges of glass cloth and resin are attached to mold at cut and bolts set for positioning.

Shown below is the female production mold joined together with a parting agent and initial coat of Vibrin resin applied. Workmen are starting lay-up of glass mat for actual body.



Costs Reduced With Stamped Rocker Arms

By Herbert Chase

WITH valve-in-head engines coming into still wider use, attention is being focused on ways of lowering the cost of components and still maintaining the quality needed in engines of high output. Toledo Stamping and Manufacturing Co. has been pioneering in the production of stamped valve rockers for about a decade and recently has added rocker shaft brackets to its line. In addition, this company has found ways to make rockers at lower cost and still keep the high quality of product already attained.

Today, stamped rockers, made by Toledo under its own patents, are widely employed on farm implement and truck engines, including Diesels, and recently have been adopted for the F-head Willys-Overland engine, bringing these rockers into the passenger car field in which there is definite promise of wider use. Since stampings have entered the field of rocker shaft brackets, they have again demonstrated ability to lower costs and still do a first class job.

Under these circumstances, it is well worth while to examine in detail the reasons for success of the stamped products. As might be expected, economics has been a leading factor but the change has not involved sacrificing engineering advantages. In fact, the stamped rocker is said to be better than some of the types of parts displaced partly because good engineering has incorporated some very decidedly original improvements.

Initially, the stamped rocker consisted of a pair of stampings welded together at both ends and brazed. Shaft hole bosses were extruded or drawn, and an insert was pressed and brazed in one end, the other end being tapped for a ball-end screw with lock nut. A steel-backed bushing lined with bronze or babbitt was pressed into the shaft bosses. This type of rocker worked well but was later replaced by a rocker stamped in one piece except for the bushing and end fitting. This change involved fewer parts and less handling and promoted precision. Assembly by spot welding and brazing was done. This form serves its purpose well and continues in extensive use.

Fig. 1—Alloy cast iron rocker for Willys-Overland engine (also made alternatively as a forging) is now replaced by a stamped assembly.

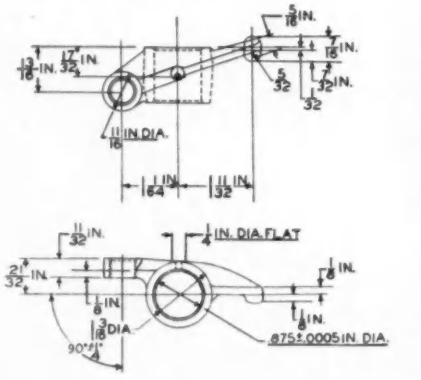
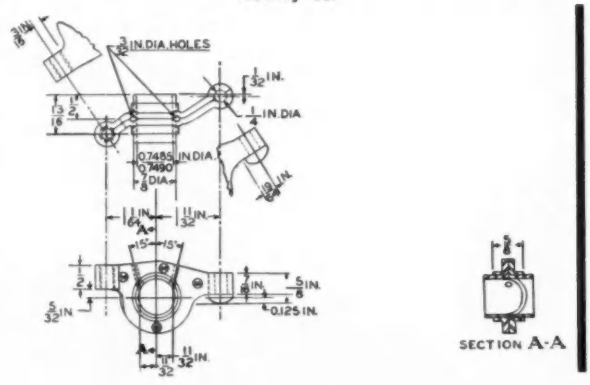


Fig. 3—This stamped rocker, also shown at A in Fig. 2, now replaces the alloy cast iron rocker shown in Fig. 1. It is supplied by Toledo Stamping and Manufacturing Co.



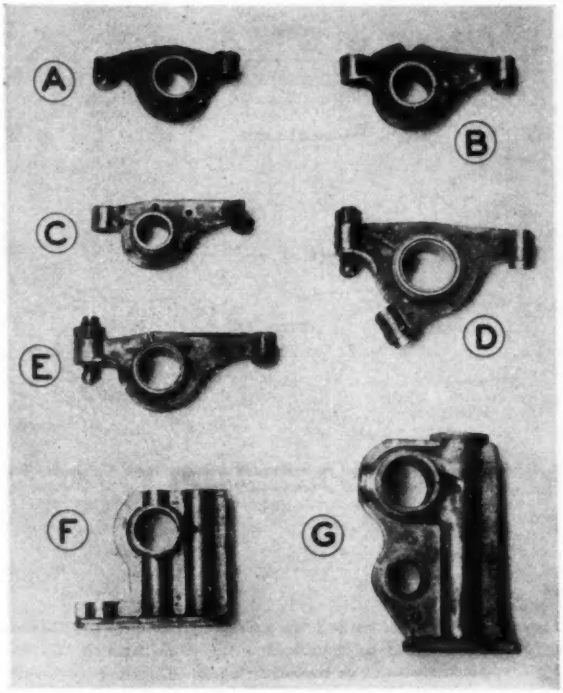


Fig. 2—Stamped rocker arms and rocker shaft brackets produced by Toledo Stamping and Manufacturing Co.: A—Willys-Overland, B—International Harvester, C—J. I. Case, D—Caterpillar, E—General Motors Truck. The two rocker shaft brackets are: F—for General Motors Truck and G—for Caterpillar.

A later form is similar in design but requires no brazing, being assembled mostly by projection welding. One end still is tapped for an adjusting screw but the insert at the other end has a necked shank and is locked in by squeezing the metal of the stamping around the neck into the necked portion. The bushing is locked by an upsetting operation after being pressed into place. This upsetting operation is done with a pin in the hole so that the latter is not reduced in size.

In all forms, oil channels are coined into the stampings and oil flow is controlled by such simple expedients as restricting the channel or beveling edges as shown in the illustrations. All operations are simple, fast and well adapted to highly efficient quantity production and assembly setups. Any degree of rigidity desired can be attained but weight usually is below that for either cast or forged parts. Nearly all operations except welding (or brazing when used), tapping and hardening are done in presses. Scrap is small and low cost hot rolled steel is employed.

Stamped rockers are made with inserted bushings of steel backed bronze or babbitt and, in this respect, are considered definitely superior to unbushed malleable or alloy castings. Besides this, the stamped type is stronger, usually lighter, has a case hardened insert and requires no small hole drilling. Coined oil passages effect precise oil distribution. Smoother appearance is an asset.

As compared with forged rockers, the stamped type costs less, requires less machine work, can be lighter and yet many dimensions are held within closer limits.

Fig. 4—Forged rocker for International Harvester tractor engine.

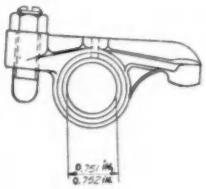


Fig. 5—Stamped rocker that replaces the forged type shown in Fig. 4.

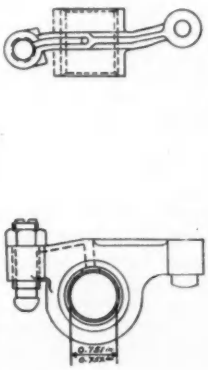
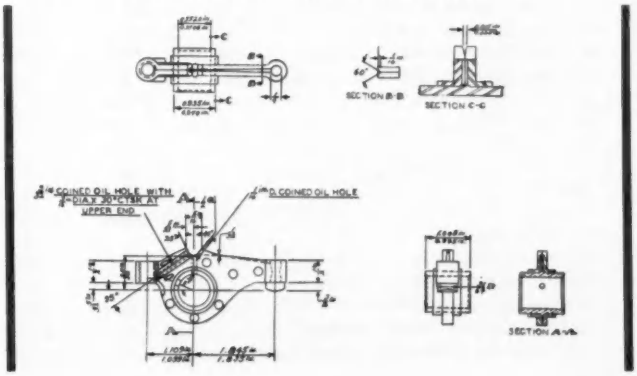


Fig. 6—Another stamped rocker for an International Harvester engine, this being a late projection welded type. Coined oil grooves are arranged in an unusual way. This part also appears at B, Fig. 2, above.



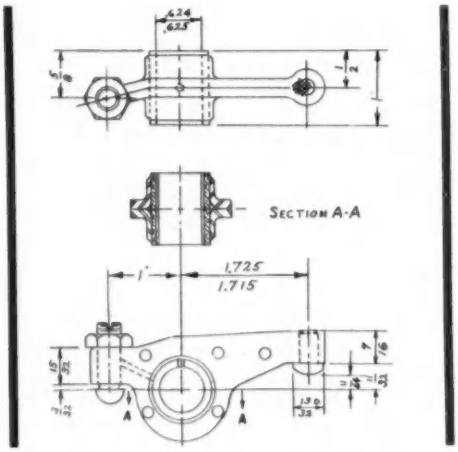


Fig. 7—Stamped rocker arm made for J. I. Case Co. engine. This part is shown also at C, Fig. 2.

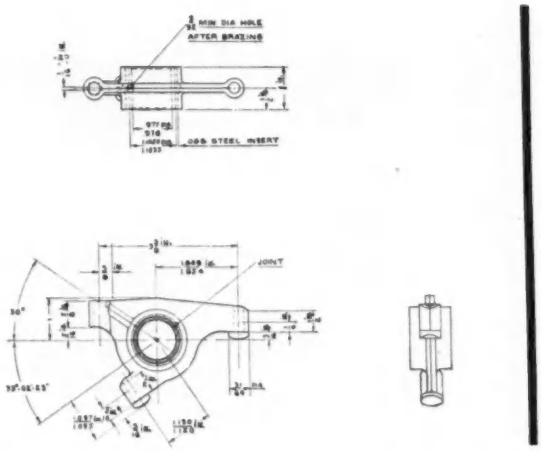


Fig. 8—Inlet valve rocker produced as a stamped assembly for a Caterpillar Diesel engine and shown also at D, Fig. 2.

Drilling of small oil holes is avoided and fine finish is attained. These comparisons are borne out by study of specific designs shown here.

Fig. 1 shows the alloy iron casting for a Willys-Overland engine. Alternative specifications permit this rocker to be forged. It has a bronze bushing and the valve contact is flame hardened to 39-45 Scleroscope. Shown at A, Fig. 2 and in Fig. 3, is the stamped equivalent supplied by Toledo Stamping and Manufacturing Co. The rocker proper is stamped from commercial hot rolled No. 11-gage steel which is blanked, pierced and formed in one piece, the bosses for the steel-back, lead babbitt lined Cleveland bushing being inserted after fabrication. Four projections are specified for welding and, after welding, a cold headed insert is added before the assembly is hydrogen brazed.

Before the bushing is applied, the whole assembly is cyanide hardened. The bushing is then inserted and is upset in a die having a pin that fits the bushing hole. This causes a small amount of metal of the steel backing to flow outward into the narrow recess between the extruded bosses and thus locks the bushing positively in place. Finally, the bore is sized to 0.7485-0.7490 in. diameter by a broach having burnishing lands above those that do the cutting. Holes in the bushing are made to register with two oil passages coined as shown on the inner face of the stamping before it is formed. The stamped assembly costs less than one forged or cast and is regarded as a superior product even though the design replaced included a bronze bushing.

International Harvester formerly used forged and bushed rockers, made as shown in Fig. 4, on its three-by-four in. four-cylinder engine. This rocker was replaced by the Toledo stamped design, Fig. 5. In this instance, there is a coined hole extending to the top and oil flows down a coined channel to the threaded ball-ended adjustable insert. Flow toward the fixed insert, which is brazed in place, is limited by beveling the upper edge of the rocker so that most of the oil tends to flow off before reaching the latter insert. Thus, sufficient oil reaches the insert and the valve stem but excess oiling is avoided.

For another International engine, the stamped design, shown at B in Fig. 2 and in Fig. 6, is employed, this being of the Toledo type that is completely projection welded (at eight points) and requires no brazing. An unusual feature of this design is the arrangement of coined oil holes and grooves. A short 1/16-in. coined hole extends from the annular groove around the bushing and between the two bosses of the stamping upward to a notch at the top. Another coined hole extends from the notch downward to the threaded insert, which thus receives an ample oil supply. The fixed insert is fed by an open coined groove of V-shape only 0.015 to 0.025 in. wide at Section C-C. This notch meters the oil flowing down to the valve stem. As the oil passages are all coined, no drilling is needed.

In this, as in other all-welded designs, the fixed insert shank is necked and is locked positively in position by closing in the metal of the stamping around the neck. All inserts have a tit thrown up on the shank just under the head and this tit fits the groove between the two halves of the stamping when the latter is formed around the radius at the end of the forming punch. Use of this tit insures that the insert will be located correctly and that the cylindrical portion forming its end will have its elements precisely parallel to the bushing axis.

Rockers made for J. I. Case Co. and shown at C in Fig. 2 and in Fig. 7, resemble the I H C design, Fig. 5, but have the oil groove coined at an angle to the screw insert. Oil is fed up through a radial hole in

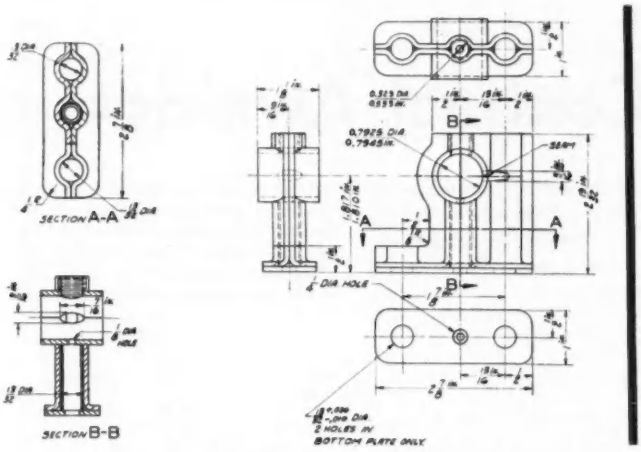


Fig. 10—Stamped rocker shaft bracket as made for a General Motors truck engine. Initial assembly is by projection welding but all joints are subsequently copper hydrogen brazed. This bracket also appears at F, Fig. 2.

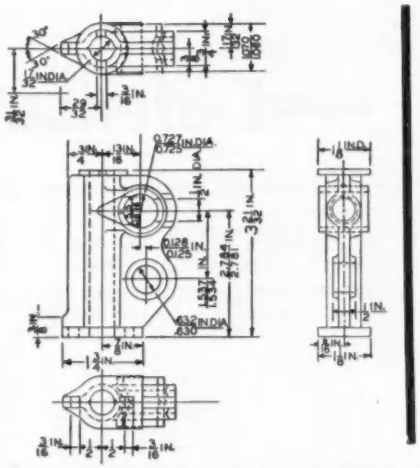


Fig. 11—Bracket assembly built up from stampings. Projection welds and staking hold the components in correct relation until copper hydrogen brazing is done at all joints. At G, Fig. 2, the same bracket is shown.

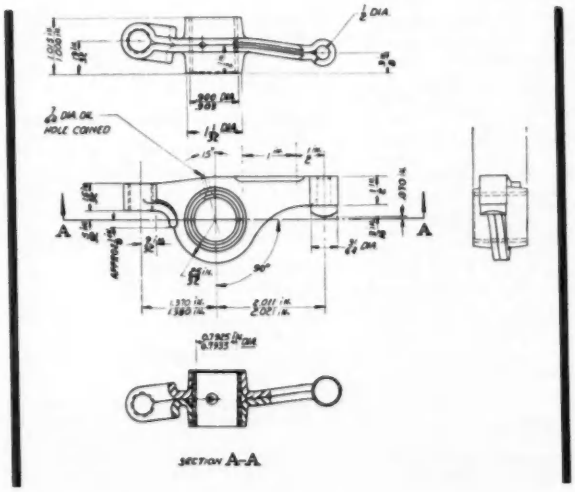
the bushing and through the circumferential groove outside the bushing to the coined hole. No brazing is required on this rocker, as assembly is by projection welding.

The inlet valve rocker for the Caterpillar Tractor Co. Diesel engine is shown at D in Fig. 2 and in Fig. 8 and is unusual in that it includes two fixed inserts, one for normal valve operation and one for preopening of the inlet valve during the starting period. Both fixed inserts are necked and the metal squeezed in around the necks for secure anchorage.

This rocker is projection welded at ten points (not shown in the line drawing) and now involves no brazing. Initially the assembly was of the brazed type but the later projection welded type is now being used.

There is a coined oil channel running from a bushing oil hole to the screw insert. The screw insert seat is coined flat and a stiffening flange runs from the lower end of the tapped boss for about a half in. downward, strengthening the assembly at the point of maximum stress.

Fig. 9—Brazed type of stamped rocker assembly, as made for a General Motors truck engine. Part of the top edge is beveled to reduce oil flow to the fixed insert. This rocker is shown also at E, Fig. 2.



General Motors truck engines make use of the rocker arm shown at E in Fig. 2 and in Fig. 9, this being the brazed type partly because both ends are offset as viewed from the top and projection welding is not well adapted for this type of design. The babbitt lined bushing is not applied, of course, until after the brazing is done and the fixed insert's face is flame hardened. A coined oil hole runs from a hole drilled in the bushing to the top face and down the latter to the adjusting screw. Little oil travels to the fixed insert above the valve because the top edges are sheared off at a 45-deg angle to limit this flow to the minimum needed for adequate lubrication of the insert and valve stem. Although this insert is brazed, it is also expanded with a center punch at the top and cannot possibly loosen. The bushing is a press fit in the

(*Turn to page* 132, *please*)

—Defense Contract Awards—

This latest list of defense prime contracts that have been awarded covers the period from Mar. 24 to Apr. 26. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

Unit quantities and dollar amounts are given for contracts from $25,000 to $250,000. Contracts above $250,000 are indicated by "over $250,000," but their actual dollar amounts and unit quantities are not available.

—A—

AC Spark Plug Div. GMC, Flint, Mich.
Tank & vehicle parts—1100 ea—$57,761
Spark plugs—51675 ea—$69,761

Aerol Co., Inc., Los Angeles, Calif.
Wheel assy—2586 ea—$68,167

Aeroproducts Municipal Aircraft, Dayton, Ohio
Maintenance parts—various—$58,650

Aeroquip Corp., Jackson, Mich.
Coupling assy—$48,242
Coupling assy—4371 ea—$28,792

Ainsworth Mfg. Corp., Detroit, Mich.
Bomb rack—$656,978

Air Associates, Inc., Teterboro, N. J.
Spare parts—$87,443
Actuator—$99,702

Airresearch Mfg. Co., Garrett Corp., Los Angeles, Calif.
Valve assy.—$26,592
Valve assemblies—$87,583
Valve assembly—226 ea—$121,711
Actuator—43 ea—$27,023
Actuator—59 ea—$50,479
Cooler assy.—128 ea—$93,050
Maintenance parts—115 ea—$61,570
Cooler assy.—61 ea—$40,994
Valve assys.—72 ea—$43,300
Valve assys.—69 ea—$48,322
Actuator—645 ea—$154,665
Maintenance parts—440 ea—$33,264
Regulator assy.—275 ea—$203,416

Allis-Chalmers Mfg. Co., Milwaukee, Wisc.
Dynamometers—$270,757

American Fabricating Co., Detroit, Mich.
Tank & combat vehicle parts—1500 ea—$32,925

American Steel Foundry, Chicago, Ill.
Vehicle parts—3950—$201,845

Armstrong Rubber Co., West Haven, Conn.
Tires & tubes—1080 ea—$419,351
Tires & tubes—12930 ea—$541,637

Austin Trailer Equipment Co., Div. of West Michigan Steel Foundry Co., Muskegon, Mich.
Vehicle parts—12550 ea—$66,222

Auto City Sheet Metal Co., Detroit, Mich.
Combat vehicle parts—200 ea—$32,120

Auto-Lite Battery Co., Toledo, Ohio
Battery, aeronautic—2674—$150,191

—B—

Bachman Wholesale Co., Rochester, N. Y.
Gun turret—$25,606
Aircrafts parts—$56,332
Auto pilot parts—$59,750

Beech Aircraft Corp., Wichita, Kansas
Spares—$160,000

Bell Aircraft Corp., Niagara Falls, N. Y.
Misc. spares—$300,000

Bendix Products Div., Bendix Aviation Corp., South Bend, Indiana
Wheel & brake assy.—$62,531
Fuel injection system—298 ea—$1,692,303
Motor vehicles—15200 ea—$46,176
Carburetor assys.—66 ea—$158,680
Wheel & brake assy.—86 ea—$36,221
Maintenance parts—over $250,000
Maintenance parts—$235,341
Wheel & brake—over $250,000
Maintenance parts—various—$113,602

Bendix Westinghouse Co., Automotive Brake Co., Elyria, Ohio
Spare parts—various—$26,805
Vehicle parts—300 ea—$45,653

Bethlehem Pacific Coast Steel, San Francisco, Calif.
Hardware—585986 ft—$63,284
1287235 lbs—

Bethlehem Steel Corp., Bethlehem, Pa.
Hardware—841300 ea—$38,255

Biederman Motor Corps., Cincinnati, Ohio
Motor vehicle parts—50 ea—$98,227
Motor vehicle parts—700 ea—$1,096,025

Boeing Airplane Co., Seattle, Washington
Lock assy.—3061 ea—$62,475

Bower Roller Bearing Co., Detroit, Mich.
Hardware—129500 ea—$140,594

Brad Foote Gear Works, Inc., Cicero, Ill.
Tank & vehicle parts—400 ea—$63,980

Breeze Corps., Newark, N. J.
Manifold assy.—329 ea—$44,487
Lead assy.—7135 ea—$40,010

Buda Co., Harvey, Ill.
Spare parts—various—$97,726

The Budd Co., Detroit, Mich.
Motor vehicle parts—2300 ea—$37,214
Motor vehicle parts—20000 ea—$211,000
Metal parts—250400—$2,296,168

—C—

Carlisle Corp., Carlisle, Pa.
Tires & tubes—65034 ea—$88,446

Caterpillar Tractor Co., Peoria, Ill.
Spare parts—various—$97,407
Spare parts—various—$34,120
Diesel generator sets 20 ea—$396,610

Chev. Motor Div., GMC, Detroit, Mich.
Truck panel—51 ea—$74,054
Truck pickup—136 ea—$282,973

Chrysler Corp., Detroit, Mich.
Motor vehicle parts—7000 ea—$77,920
Vehicle parts—36000 ea—$25,739
Hardware—91100 ea—$39,265
Motor vehicle parts—16828 ea—$122,661
Vehicle parts—94500 ea—$25,350

Clayton Mfg. Co., El Monte, Calif.
Spare parts—$390,259

The Cleveland Pneumatic Tool Co., Cleveland, Ohio
Strut assy.—8 ea—$30,876

Columbia Steel & Shafting Co., Pittsburgh, Pa.
Hardware—10000 ft—$37,364

Consolidated Vultee Aircraft Corp., San Diego Div., San Diego, Calif.
Maintenance parts—2201 ea—$38,908

Consolidated Vultee Aircraft Corp., Fort Worth, Texas
Modification kits—$323,814

Continental Aviation & Engr. Corp., Detroit, Mich.
Tank automotive spare parts—124734—$3,440,925

Continental Motors Corp., Muskegon, Mich.
Tanks & vehicle parts—952 ea—$68,645
Tank & combat vehicle parts—1470 ea—$63,209

Cooper Tire & Rubber Co., Findlay, Ohio
Tires—2700 ea—$42,741
Tires & tubes—17200 ea—$212,764
Tires & tubes—4134 ea—$423,971

S. J. Corbett Co., Detroit, Mich.
Motor vehicle parts—6350 ea—$54,640

C.T.W. Co., Buffalo, N. Y.
Bomb rack—$53,344

James Cunningham Son & Co., Rochester, N. Y.
Tank & combat vehicle parts—1450 ea—$43,761

Curtiss-Wright Prop. Div., Curtiss-Wright Corp., Caldwell, N. J.
Propeller assemblies—$597,872
Propeller assemblies—$1,287,201

(*Turn to page* 138, *please*)

— New Defense Facilities —

SUPPLEMENTING the list of Certificates of Necessity issued up to March 26 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the April 15 issue, page 72, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration between March 26 and April 23.

Included in this latest tabulation, 8992 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being $17,946,409,000. These figures are exclusive of cases that are up for later review but included in this list—in these cases no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-off.

—A—

ACF Brill Motors Co., Richmond, Calif.
Engine assemblies & packaging—$37,356 (50)

Accurate Grinding Co., Los Angeles, Calif.
Aircraft parts—$5,381 (80)

Acme-Hamilton Mfg. Corp., Trenton, N. J.
Wire braided hose for aircraft—$37,235 (65)

Aircraft Engineering Products, Inc., Clifton, N. J.
Aircraft products—$51,491 (80)

Airquipment Co., Burbank, Calif.
Aircraft equipment—$23,079 (70)

Aluminum Company of America, Cleveland, O.
Aluminum forgings for aircraft—$182,000 (65)

American Bosch Corp., Springfield, Mass.
Aircraft parts—$381,110 (65)

American Brake Shoe Co., Mahwah, N. J.
Research & development—$712,800 (65)

American Insulator Corp., New Freedom, Pa.
Aircraft parts—$24,004 (50)

American Non-Gran Bronze Co., Berwyn, Pa.
Aircraft engine valve guides—$40,016 (70)

American Standard Corp., Trevose, Pa.
Aircraft parts—$34,864 (70)

American Tool & Die Co., Los Angeles, Calif.
Aircraft parts—$11,392 (75)

American Tool & Engr. Co., Kalamazoo, Michigan.
Aircraft parts—$107,300 (80)

The Apex Machine & Tool Co., Dayton, Ohio.
Aircraft parts—$429,843 (70)

Art Mill Machine & Mfg., Inc., Columbus, Ohio.
Aircraft parts—$5,726 (80)

Auburn Spark Plug Co., Auburn, N. Y.
Aircraft parts—$7,871 (80)

The D. L. Auld Co., Columbus, Ohio.
Aluminum forgings for aircraft—$45,424 (65)

Axelson Mfg. Co., Veronan, Calif.
Aircraft parts—$49,611 (65)

—B—

Bard-Parker Co., Inc., Danbury, Conn.
Aircraft parts—$42,872 (80)

Bell Aircraft Corp., Wheatfield, N. Y.
Aircraft parts—$153,656 (65)

Bendix Aviation Corp., Towson, Md.
Electronic instruments—$73,986 (65)

Borg-Warner Corp., Muncie, Ind.
Aircraft parts—$3,320,000 (65)

R. J. Boutell, Lynwood, Calif.
Aircraft parts—$9,887 (70)

Brown's Machine Shop, South Gate, Calif.
Aircraft parts—$14,167 (80)

Butler Mfg. Co., Kansas City, Mo.
Aircraft parts—$81,532 (50)

—C—

Cablair Products Co., Culver City, Calif.
Airframe parts—$10,789 (80)

S. C. Carter Co., Inc., Los Angeles, Cal.
Aircraft parts—$31,000 (80)

Caval Tool & Machine Co., Newington, Conn.
Aircraft parts—$29,029 (70)

The Cessna Aircraft Co., Wichita, Kans.
Aircraft parts—$22,487 (65)

Chicago Cutting Die Co., Chicago, Ill.
Aircraft parts—$12,532 (75)

Norman C. Collins, La Mesa, Calif.
Aircraft engine parts—$15,000 (70)

Collins Engineering Co., Culver City, Calif.
Aircraft parts—$174,970 (50)

Collins Engineering Co., Inglewood, Calif.
Aircraft parts—$160,000 (50)

Connecticut Filter Corp., Stafford Springs, Conn.
Aircraft parts—$182,485 (50)

Corliss Machine Works, Los Angeles, Calif.
Components for aircraft—$8,295 (80)

Curtiss-Wright Corp., Buffalo, N. Y.
Aircraft parts—$3,178,080 (65)

—D—

Deere Mfg. Co., John Deere Waterloo Tractor Works, Waterloo, Iowa.
Ordnance—$260,051 (65)

Drayer-Hanson, Inc., Los Angeles, Calif.
Aircraft parts—$498,000 (80)

—E—

Electric Hose & Rubber Co., Wilmington, Del.
Wire hose braided for aircraft—$366,000 (65)

—F—

Federal Screw Works, Chelsea, Mich.
Aircraft engine parts—$367,582 (50)

The Ferry Cap & Set Screw Co., Cleveland, Ohio.
Aircraft parts—$100,668 (50)

Fibreform Machine Works, Los Angeles, Calif.
Aircraft parts—$24,027 (70)

The Fuller Brush Co., Hartford, Conn.
Aircraft accessories—$124,632 (80)

—G—

General Bronze Corp., Garden City, N. Y.
Aircraft parts—$99,311 (70)

General Motors Corp., Pontiac, Mich.
Ordnance—$226,981 (65)

General Motors Corp., Wayne, Mich.
Auxiliary generators—$226,563 (65)

General Motors Corp., Lockport, N. Y.
Ordnance—$74,225 (50)

General Motors Corp., Arlington, Tex.
Airplanes—$18,369,579 (40)

G. M. Giannini & Co., Inc., Springfield, N. J.
Aircraft parts—$4,142 (65)

Gits Bros. Mfg. Co., Chicago, Ill.
Aircraft parts—$13,309 (75)

The B. F. Goodrich Co., Tuscaloosa, Ala.
Military tires—$909,300 (25)

B. F. Goodrich Co., Akron, Ohio.
Wire braided hose for aircraft—$81,920 (65)
Wire braided hose for aircraft—$196,000 (65)
Wire braided hose for aircraft—$24,068 (65)

B. F. Goodrich Co., Miami, Okla.
Military tires—$122,994 (75)
Military truck tires—$299,698 (60)

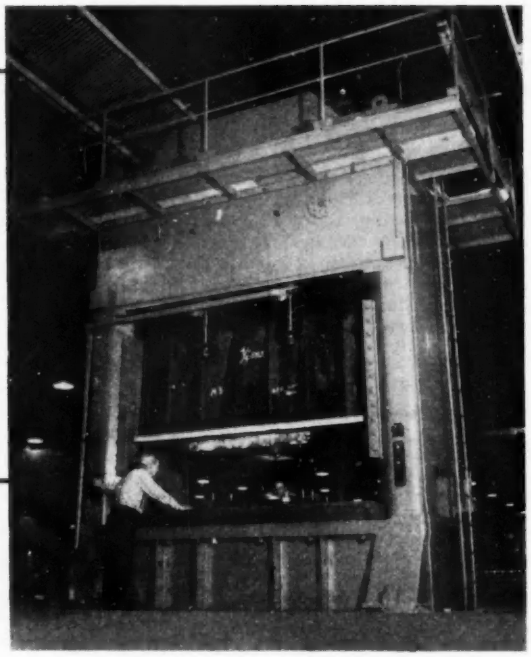
Goodyear Aircraft Corp., Akron, Ohio.
Airships and parts—$509,305 (65)

B. F. Goodrich Co., Oaks, Pa.
Military truck tires—$305,540 (50)

Grandahl Tool & Machine Co., Hartford, Conn.
Aircraft parts—$7,157 (80)

(*Turn to page 156, please*)

Jet Engine Parts *Made on* Huge Presses



This 600-ton press is one of the four Warcos installed recently at Ryan. These presses are eccentric geared and utilize straight shafts with windup and torsional loads eliminated.

FOUR new Warco presses have been installed by the Ryan Aeronautical Co., San Diego, Calif., to step up production of high temperature structures for jet engines. Capable of exerting up to 600 tons pressure at a stroke, these mammoth machines will be used to stamp out parts for exhaust cones, transition liners, aft frames and other jet components. **Largest of the** presses—a 230,000-lb machine—is the biggest piece of equipment ever installed at Ryan. These new presses are made by the Federal Machine and Welder Co., Warren, Ohio.

The arrival of the Warco presses highlights a production trend which is influencing the aircraft industry. Greater emphasis is being placed upon the design and fabrication of large, single-piece components, which can be pressed out in huge machines, instead of forming these structures by joining many small parts.

An example of the benefit of this trend is illustrated in the use to which Ryan is putting the presses in fabricating exhaust cones for General Electric J-47 jet engines. Formerly, the large stainless steel skins for these cone assemblies had to be cut out in patterns by both power shears and rotary cutters. Then, they were manually drilled with radial-arm drills and placed in punch presses where special dies blanked the cutouts for fittings. After these operations, the holes were de-burred and the sheets were rolled and welded.

One hour of labor and a number of machines, dies and individual handlings were required to prepare each skin prior to rolling. Now, the same results are accomplished in a fraction of the time by using precision steel dies, weighing six tons, in the largest Warco. The press blanks and pierces the complete sheet with utmost precision, and de-burring is kept to a minimum because the close-fitting dies shear cleanly with little burr residue.

The big presses will be used to form, draw and emboss J-47 combustion chambers, transition liners, aft frames and afterburner parts as well as blank and pierce them. In some cases, four-stage dies can be used in a single press bed so that each stroke of the ram can perform four different press operations.

Designed for handling high temperature jet engine exhausts, the exhaust cone assemblies shown here are typical of the structures that Ryan is making with the new presses.

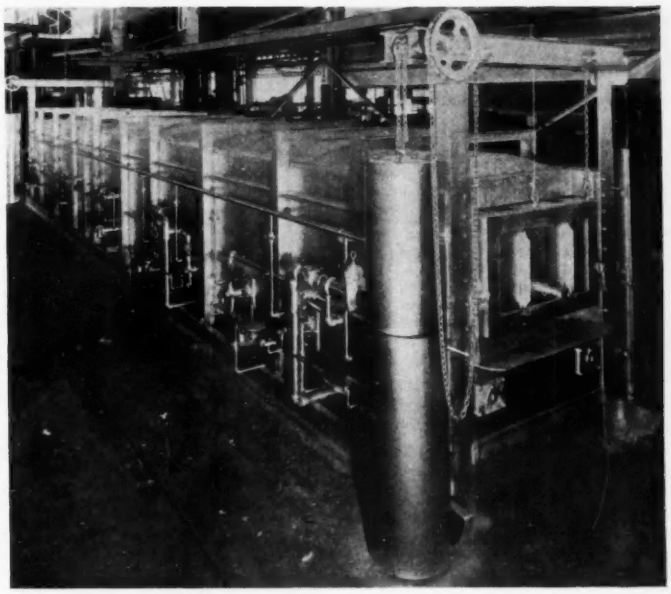
News of the MACHINERY INDUSTRIES

By Thomas Mac New

U. S. Government Policies Have Fostered Growth of European Tool Builders. New Tools Are Developed for Turbojet Production.

Effect of Foreign Competition

American machine tool companies are beginning to feel the effects of competition from the revitalized foreign machine tool industry, which has been stimulated by ECA funds. It was reported by the National Machine Tool Builders' Association that orders from foreign countries during February dropped to $4.2 million from $10 million the preceding month. This is the lowest since the association began keeping statistics back in 1918. Not only are foreign tools makers taking business away from American manufacturers in foreign markets but also are invading this country on a much larger scale than ever before. This is possible, according to the NMTBA, because of Government policy which has built up the machine tool industry in Europe so that manufacturers there can sell in all markets without bothering with Government ratings or other interferences from a defense program. Foreign sales always have been the mainstay of the American machine tool industry in recurring periods of decline in the American market. If the present situation operates to sever this relationship, it will be most unfortunate.



The longest standard heat treat furnace ever built in the Toledo plant of Surface Combustion Corp. was recently delivered to Whitehall Precision Castings Div., Michigan Steel Castings Co. This complete double-end furnace, 40 ft long from door to door, is used by Whitehall for preheating and dewaxing of molds during casting operations by the lost wax process. Five progresive zones, each with automatic temperature control, are used to control expansion of the investment mold.

Two Tools for Jets

To meet the requirements of the jet engine program, Monarch Machine Tool Co. is producing two new models of right angle (T) lathes. These models were shown at a preview in Sidney, Ohio, on May 5th. One machine has a constant surface cutting speed, while the other has a constant spindle speed. Monarch's Air-Gage Tracer has been applied to both; one model in fact carries two of these units to control turning, boring, and facing operations simultaneously. Both tools were put through completely tooled operating demonstrations.

50th for Broaching

As a factor in industrial production, broaching is really a development of the 20th Century. One of the firms that has sparked the growth of this method during the first half of this century is celebrating its Golden Anniversary. In 1902 the Lapointe Machine Tool Co. was incorporated in Boston, Mass., and one year later moved into a new plant in Hudson, Mass.—the firm's present home. Since the start in 1902, the company developed the first screw-type broaching machine (1902), made a broach sharpener which enabled production shops to do their own broach sharpening (1923), brought out the Rotor-Kut to handle primary operations — particularly on malleables and forgings (1925), and put on the market the first automatic indexing and turret machine—to handle multiple operations and multiple cuts (1941). Currently the company is pioneering in broaching methods for jet engine manufacture.

Defense Facilities

Figures released by the Government show that fast tax writeoffs for new or expanded facilities in the machinery industries to the amount of $651,793,000 have been authorized. As of March 31, 1952, approximately 58 per cent of the facilities are estimated to be in place. In considering the cost of expansion, machinery and equipment account for the great bulk of the cost, running to 65 per cent. Construction costs amount to 31 per cent, with the balance going for land and overhead expenditures.

(*Turn to page* 120, *please*)

NEW EQUIPMENT PLANT • PRODUCTION

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Grinder for Jet Engine Blades and Buckets

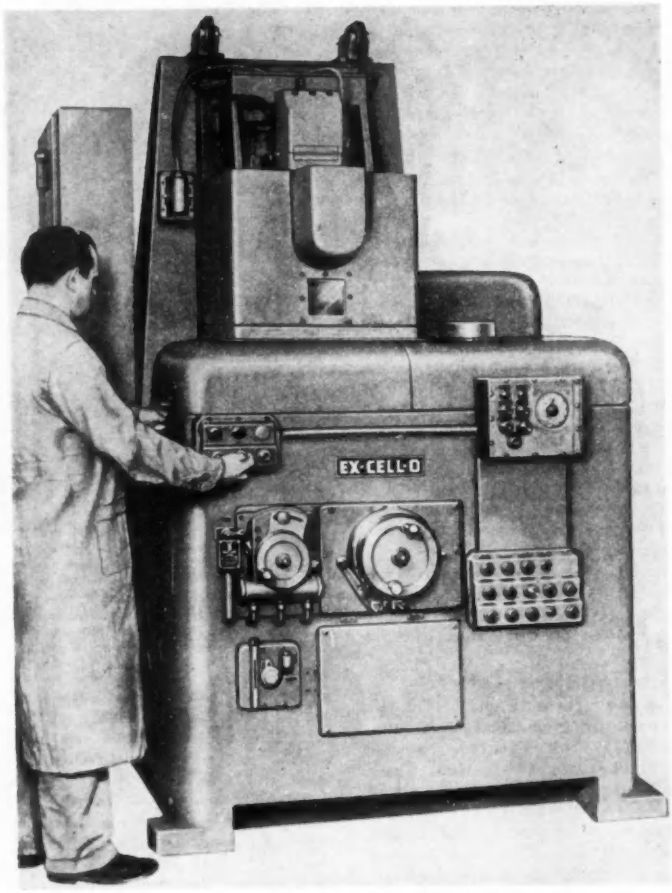
Style 84 precision surface form grinder has been added to a line of standard blade finishing machines. This model grinds flat, grooved or curved surfaces on the roots of jet engine compressor blades and turbine buckets. Machining cycle is fully automatic.

A reciprocating work table is hydraulically operated and electrically controlled. It accommodates removable work fixtures designed to suit the individual blades or buckets, and the work may be left in these fixtures for subsequent operations.

A short, rigid column supports the spindle slide. The grinding spindle is mounted horizontally and is adjustable endwise for positioning preformed wheels in relation to the dresser. A motor mounted on the machine base drives the spindle through V-belts. Wheel speeds are changed by changing belts and pulleys.

Dressing is part of the automatic machine cycle, but the dresser also may be controlled manually for setting up a new wheel or adjusting the cam. All controls are at the front of the machine within easy reach. A central handwheel controls grinding size. It is arranged with a coarse feed for quick setup and a fine feed for accurate sizing. Automatic feed to finish size and retract are part of the machine cycle. *Ex-Cell-O Corp.*

Circle E-1 on page 65 for more data

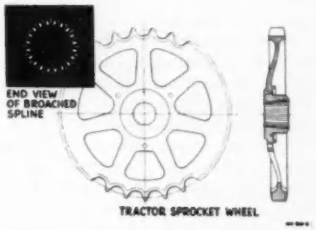


Ex-Cell-O grinder, Style 84, for flat grooved or curved surfaces.

Pull-Down Broaching Machine

Use of the broaching process in the production of accurate tapered splines on several different sizes of parts is said to be possible with a broaching machine recently developed. Basically, it is a 15-ton, 66-in. stroke, pull-down model, equipped with a special table and an adjustable short shuttle travel.

The automatic machine is designed to produce several sizes of angular straight-sided splines in tractor sprocket wheels, etc., of varying outside diameters. A tractor wheel is placed over the broach tower on a fixture plate with the broach in the down position. The angle of the plate is made so that the broach, which



Line drawing of tractor sprocket wheels with an inset showing the end view of the tapered spline.

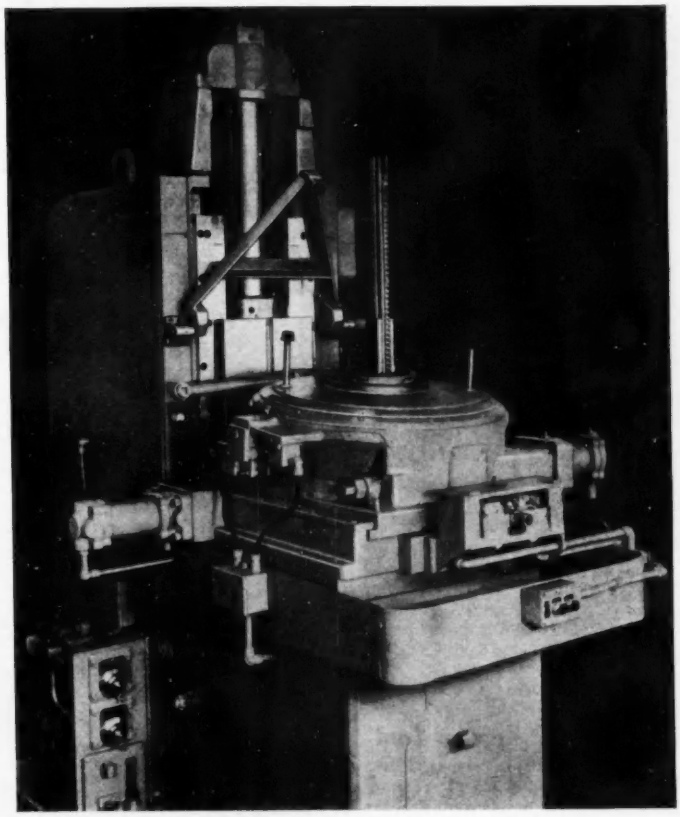
travels vertically, will produce splines with the correct amount of taper. Parts are held in position with hold-down studs and a strap clamp.

When the part is clamped in position, the broach travels up, the table shuttles into position for broaching, the broach travels down, the table recedes, the fixture indexes to position for the next spline and the cycle repeats. When all splines have been produced, the machine stops for unloading.

Operation is hydraulic throughout with electrical controls. A hinged arm on the machine column is swung into position by a manually controlled hydraulic cylinder after the part is loaded into place. This arm backs up the broach guide during the cut and thus avoids broach deflection.

On the tractor wheel, the maximum shuttle movement is ⅝ in. Some sizes of splines in the hubs permit shuttle movement to be adjusted to 3/16 in. The largest part broached on the machine has a 42-in. OD. Concentricity of splines with the outside diameter of the parts is achieved by fitting the outside diameter into a ground hole in the fixture plate. Fixture plates are interchanged to suit the various parts. *Colonial Broach Co.*

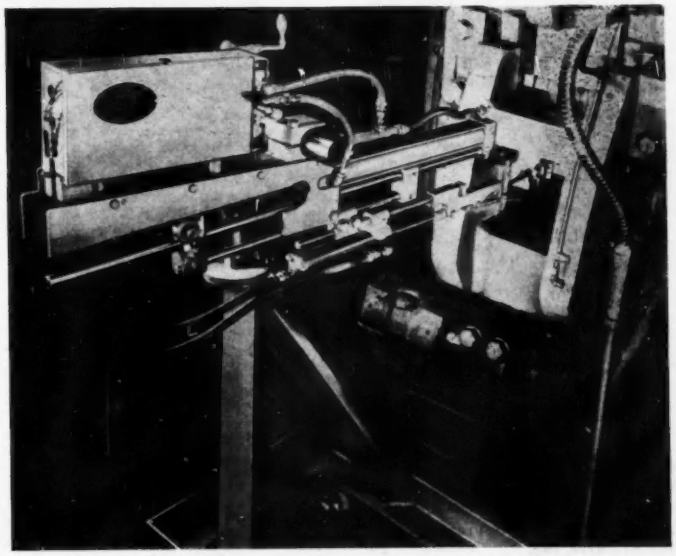
Circle E-2 on page 65 for more data



Colonial pull down automatic broaching machine.

Portable Automatic Press Unloader

As companion equipment to a line of swinging-arm type automatic press unloaders, a portable unloader which can be wheeled up to small and medium size presses for automatic removal of small parts has been brought out. The machine, which consists of the same jaw, air cylinder and electric control assemblies used on Iron Hands, can be adjusted up and down to reach various die levels and be set at any required angle. Jaw travel is in a straight line and is claimed to



Sahlin portable swinging-arm type automatic press unloader.

NEW EQUIPMENT PLANT • PRODUCTION

For additional information regarding any of these items, please use coupon on page 62

(*Continued from page 57*)

be especially suited for the removal of small parts at high speed.

The unloader is mounted on a heavy steel frame which rides on four caster-type wheels. A built-in locking device is provided. Operation of the new unloader is as follows: When the ram descends and completes the forming or shearing operation, the steel jaw moves into the die and takes a firm hold on the stamping the moment the ram rises sufficiently. The jaw lifts the stamping, moves back out of the die and drops the stamping in a tote box or on to a conveyor. It then returns to its original position to await the next cycle. *Sahlin Engineering Co.*

Circle E-3 on page 65 for more data

Air-Powered Torque Tool

An air-powered nut runner, Power Torque Tool Model MA-25, recently introduced, gives torque control in the 0 to 25 in. lb range. Special gearing is available to extend this torque range

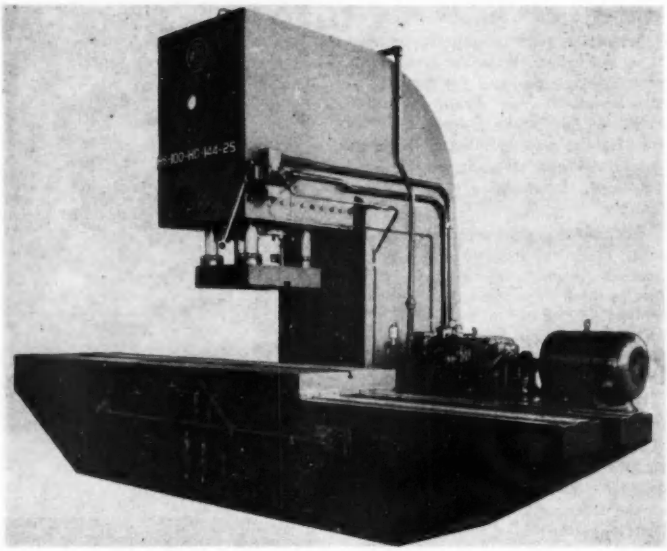
Garvin air-powered nut runner

to 40 in. lb. Desired torque is set by using the built-in torque wrench as a gage.

Complete unit includes remote control box which contains solenoid valves and control switches. Accessories are available where desired to filter air and regulate pressure. *Garvin Brothers, Inc.*

Circle E-5 on page 65 for more data

Hydraulic Straightening Press Features Two-Dimension Positioning



Development of a highly versatile hydraulic straightening press featuring fast two-dimension positioning of the work has been announced by the maker. Positioning is obtained by hydraulic systems which move the press bed from side-to-side and the plunger assembly from front-to-back. It allows a number of blows to be struck at different places on a single piece without changing the setting on the press table. Speed of operation is increased by a quick advance and return feature of the Hydro-Dynamic circuit which allows the slide to advance rapidly to the work and then slow up and do the actual straightening at slow speed, while returning to the up position rapidly. The Bliss Hydro-Dynamic circuit, as applied to this 100-ton press, consists of a high-speed variable delivery rotary pump which controls the pressing speed and reversal. E. W. Bliss Co.

Circle E-4 on page 65 for more data

Oil-Tight Pushbuttons

A number of advanced design features are incorporated in a line of oil-tight pushbutton units for machine tool applications. The units, designed completely on the building-block principle, feature self-a-line contacts and removable color rings for pushbutton identification.

Building-block construction is said to provide increased flexibility of application because the basic units can be arranged in various combinations to meet all special as well as standard requirements.

New self-a-line double-break contacts are placed at an angle so they close with a rolling action. The operating lever strikes a curved surface on the movable contact.

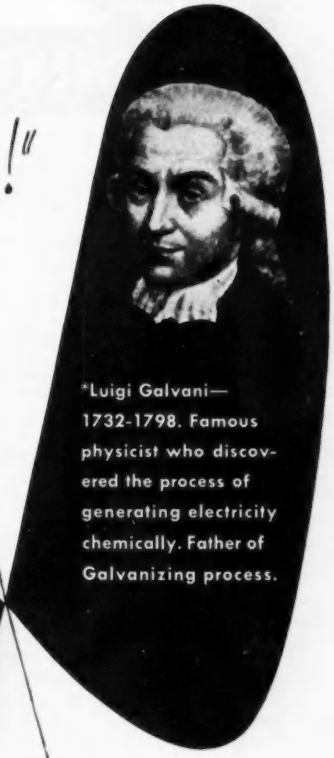
Only one basic form of contact block is used in the units—a single-pole, double-throw type made of Melamine for maximum arc resistance. Double-pole, double-throw combinations are made by mounting two of these units on the same base, and tandem combinations giving up to four normally-open and normally-closed contacts can be made by combining four blocks with a simple adapter plate.

Operator types available for the new pushbutton units include standard pushbutton, extra-long pushbutton, mushroom-head button, six forms of selector switches, two forms of combination units, padlock unit, and cylinder lock unit.

The aluminum enclosures meet all

(*Turn to page 60, please*)

"Old Luigi Galvani would certainly get a shock out of this!"



*Luigi Galvani—1732-1798. Famous physicist who discovered the process of generating electricity chemically. Father of Galvanizing process.

Inland's new continuous galvanizing line . . . the longest in the U. S. A.

Fed into this new galvanizing line, cold-rolled strip is flame-cleaned, annealed and galvanized. It emerges a full city block away, cut to length or coiled.

Galvanized steel sheets produced on this line under the patented Sendzimer process, and bearing Inland's trade mark, TI-CO, have no brittle iron-zinc layer like ordinary galvanized sheets. That's why TI-CO can be severely formed without flaking or peeling. And TI-CO's bright, smooth surface increases sales acceptance of products fabricated from it.

This new galvanizing line is another of the improved steel-making facilities that help Inland to produce better quality steels in record-breaking quantities.

INLAND

INLAND STEEL COMPANY
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(*Continued from page 58*)

J.I.C. specifications and are finished in machine-tool gray. Offered with one, two, three, four, six, and nine button stations, they are fully oil-tight and provide maximum dust protection.

Depth of the unit enclosures is 3 7/32 in., and a standard pushbutton extends ½ in. beyond case. Other dimensions depend upon the number of stations in the unit. Contacts are rated at 115, 230, 460, and 575 volts. *General Electric Co.*

Circle E-6 on page 65 for more data

Machine for Exhaust Manifolds

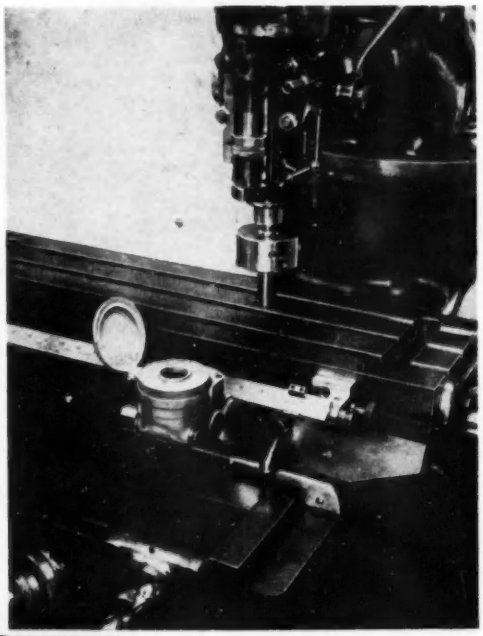
A special machine tool which mills, drills, bores, chamfers and taps exhaust manifolds has been developed.

The machine is a dial type unit and utilizes the Cross heavy duty index table. It mills and drills the mounting face; and mills, bores, drills and taps the tail pipe pad on 120 manifolds per hr at 100 per cent efficiency. Right or left hand parts are machined without changing the set-up.

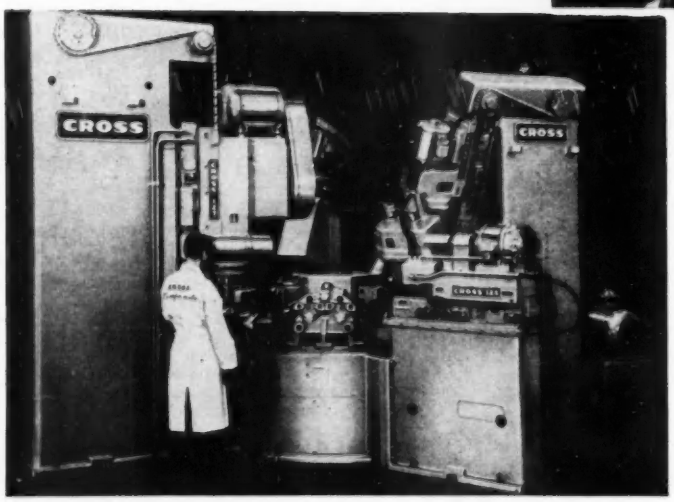
Six stations are used—one for loading, two for milling, two for drilling and boring, and one for tapping. Pre-set tools are used to reduce down-time and minimize scrap losses during set-ups.

Electrical and hydraulic construction is to Joint Industry Conference standards. Other features include power indexing; hydraulic feed for milling, drilling and boring; individual lead screw feed for tapping; and hardened and ground ways. *Cross Co.*

Circle E-7 on page 65 for more data



Griswold optical system for making linear measurements, Scan-A-Scale.



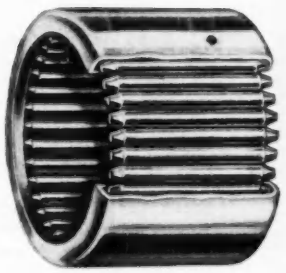
Cross special unit for machining exhaust manifolds.

Optical System for Linear Measurement

Scan-A-Scale, a product now being offered, is claimed to provide a very precise and simple optical method of making linear measurements on machine tools with direct visual reading. This unit consists of two microscopes and two satin chrome finished scales graduated in 0.050 in. By rotating a dial on the microscope, the 0.050-in. graduation on the scale can be divided so that readings to four decimal places can be determined. Uses include: Controlling table movement and boring head location on jig borers and boring mills; positioning lathe carriages longitudinally in order to secure length settings; locating milling machine table in respect to the

(*Turn to page 62, please*)

easy mounting...



Torrington Needle Bearings are easy to mount. Installation is a simple arbor press operation. Assembly time and expenses are reduced.

You can forget about spacers, retainers and positioning shoulders, too. They are not needed with Needle Bearings. A straight bore, of proper size, serves as the housing. Thus, design is simplified and machining time is saved.

Would you like to know more about Torrington Needle Bearings in terms of your own anti-friction requirements? Our engineering department will be glad to help.

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(*Continued from page* 60)

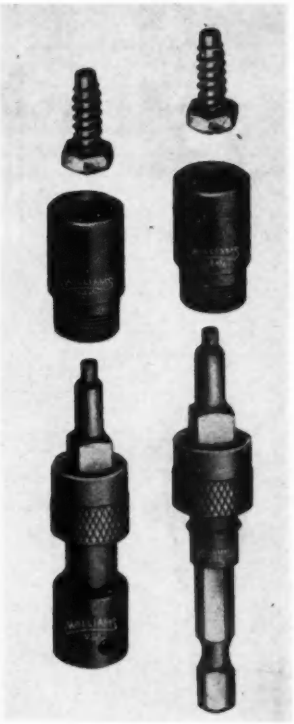
spindle in all of its three planes; positioning cylindrical grinding machine tables in relation to the side of the wheel. *F. T. Griswold Mfg. Co.*

Circle E-8 on page 65 for more data

Magnetic Driving Devices

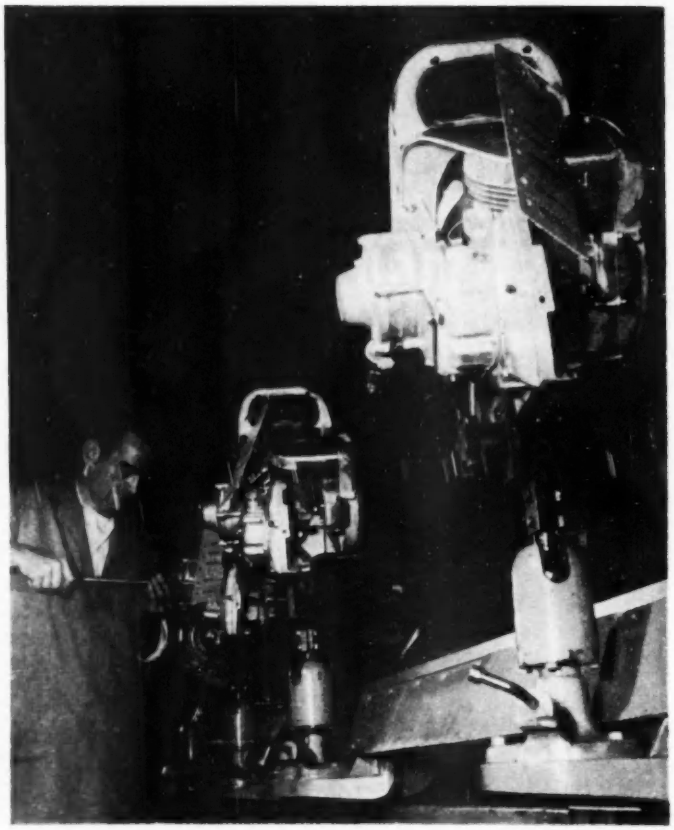
A magnetic adapter and magnetic hexagon-square shank have been developed for use only with Impact "Supersockets" to drive hex head hardened and self-tapping screws. A telescopic magnetic device passes within an assembled socket and contacts the screw head, retaining same within the socket opening. The Alnico magnet, imbedded in the drive member, is spring loaded to overcome air gaps and transmits its magnetism through a hardened steel tip to the head of the screw.

The left hand threaded socket connection is said to provide a positive fastening of the socket to the shank or adapter. A hexagon-square shank and an adapter are available for ¼-in. drive size tools with socket openings ¼, 9/32, 5/16 and ⅜ in. *J. H. Williams & Co.*



Williams Impact "Supersockets".

Circle E-9 on page 65 for more data



Wilton work positioner, the Powrarm, is shown installed on the assembly line of McCulloch Motors Corp.

Work Positioner for Assembly and Inspection

Work pieces can be placed at any angle on a 360 deg horizontal plane, 180 deg vertical plane and 360 deg axial plane and in any combination of positions simultaneously with a recently developed work positioner, the Powrarm. This unit holds the assembly or working piece rigidly, permitting the worker to have both hands free.

Powrarm can be fastened to a fixed base or installed on moving production or assembly lines. It is available in three sizes which will support work ranging in weight from 24 to 150 lb. Hydraulic and mechanical models are produced. *Wilton Tool Mfg. Co.*

Circle E-10 on page 65 for more data

SILASTIC* WORKS... Where Ordinary Rubber Fails!

THESE hot air shut-off valves for jet planes must give positive control of hot air used for such vital functions as defrosting, anti-icing and the regulation of cabin air temperature and pressure. Silastic O-rings withstood 3000 cycles at 500°F. plus 2000 cycles at 600°F. plus 100 cycles at 700°F. before life-tests were discontinued.

At temperatures ranging from —100 to over 500°F., Silastic shows extraordinary resistance to compression set or to permanent deformation. Extreme temperatures, shock and vibration, hot oil, oxidation, corona, outdoor weathering and the mere passage of time have little or no effect on the properties of Silastic.

Silastic is, therefore, the best resilient gasketing material available for hundreds of applications ranging from seals for domestic steam irons to O-rings and gaskets for cylinder liners, water ports and oil pans in diesel-electric locomotives. And Silastic R Tape is the only resilient insulating tape that will withstand Class H temperatures in electric motors, transformers and coils.

That's why design and production engineers specify Silastic for applications where other resilient materials are subject to rapid failure. They've found that, among rubberlike materials, nothing compares with Silastic for reliability, long life and low maintenance costs under tough service conditions.

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In Canada: Fiberglas Canada, Ltd., Toronto
In England: Midland Silicones Ltd., London

NEW PRODUCTS

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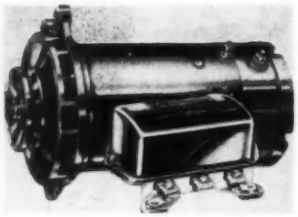
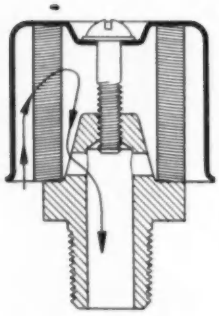


Low Cut-in Automotive Generator

A 55 amp, low cut-in, automotive generator has been announced as available. Designated as Type GRC, this generator will produce 20 amp of current at idling speeds and a full 55 amp at 15 mph — providing the battery or current consumers need that much current.

Voltage regulation is provided by a heavy duty RGR regulator which provides two stage regulation and positive protection against runaway voltage. The GRC generator is a compact five-in. diam unit. *American Bosch Corp.*

Circle P-1 on page 65 for more data



Automotive Air Vent Filters

A series of ribbon element air vent filters has been placed on the market. These filters are available in three sizes ¼ in., ½ in. and ¾ in. pipe thread.

Outstanding among performance characteristics is said to be that the filters offer positive controlled filtration. The specially designed element is claimed to permit approximately 40 micron filtration (0.0016 in.).

The air vent filter has applications for hydraulic systems, air compressors, intake, carburetor intake for small gasoline engines, crankcase ventilation, pneumatic cylinders, fuel tank breathers, pneumatic instruments, immersion or sump filters and others. *Skinner Purifiers Div., Bendix Aviation Corp.*

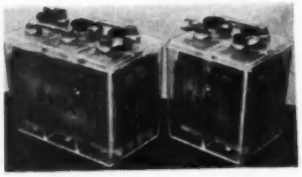
Circle P-2 on page 65 for more data

Silicone Rubber Impregnated Material

ArcoSil No. 2184 is the most recent of a line of silicone rubber impregnated materials that has been developed to meet the need for ducting, sleeves and couplings with resistance to high and low temperatures. The material combines a newly developed silicone rubber compound with improved fabrication techniques. Items manufactured from ArcoSil No. 2184 are said to withstand temperatures as high as 700 F., remain flexible at —125 F; resist aging, ozone and most corrosive fluids and gases.

An important characteristic of the material, according to the maker, is that it lends itself readily to the forming of both simple and complex shapes. *Arrowhead Rubber Co.*

Circle P-3 on page 65 for more data



Storage Batteries

A series of storage batteries of two-cell and three-cell construction, said to offer advantages in space and weight saving, maintenance and improved dependability, are now available. Designated as Type PLX, the batteries are in transparent polystyrene plastic cases, as shown, left.

The two-cell PLX batteries have a 50-amp hr capacity at the eight-hr rate, while the three-cell units have a 100-amp hr capacity at the same rate. *The Electric Storage Battery Co.*

Circle P-4 on page 65 for more data

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FREE LITERATURE

Die Casting Machines

A bulletin, 23-1, containing general information, illustrations, specifications, concerning a new line of die casting machines has been released. It also offers an explanation of the Pressure Pac and Wedge Cam Toggle patented features. *Lake Erie Engineering Corp.*

Circle L-1 on postcard for free copy.

Paint Strainers

Two paint strainers are described in a recently issued leaflet. A spray gun strainer and a model furnished with a wire stand are the types discussed. *Gardner Laboratory, Inc.*

Circle L-2 on postcard for free copy.

Defense Pricing

Application of established commercial practices in Government procurement is sought in a booklet bearing the title, "Defense Contract Pricing." It covers both fixed-price and cost-reimbursement types of Government contracts. *Chamber of Commerce of the United States.*

Circle L-3 on postcard for free copy.

Squaring Shears Air Powered

A four page illustrated bulletin, 87-A, deals with construction, new features, specifications and operation of air powered squaring shears. *Niagara Machine and Tool Works.*

Circle L-4 on postcard for free copy.

Electronic Control Elements

General basic information relating to physical and operating characteristics of Thermistors, which are electronic semi-conductor control elements whose electrical resistance responds negatively to minute temperature changes, is contained in a 30-page catalog (TH5) which has been made available. *Carboloy Dept., General Electric Co.*

Circle L-5 on postcard for free copy.

Fork Lift Trucks

Three new bulletins which illustrate and describe models of the new "FT Series" fork lift trucks have been released. These include bulletin No. 1579, bulletin No. 1580, and bulletin No. 1581. Models range from 3000 to 4000 lb load capacity and are either gasoline or Diesel powered. *The Buda Co.*

Circle L-6 on postcard for free copy.

Aviation Fuels and Lubricants

Volume 38, Number 4 of Lubrication contains an article devoted to fuels and lubricants of various aircraft engines including the gas turbines. It covers the period from 1908 to present. *Texas Co.*

Circle L-7 on postcard for free copy.

Machine for Die Casting

Recently released is a new bulletin which describes in detail the Model

(*Please turn page*)

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FREE LITERATURE				NEW PRODUCTION & PLANT EQUIPMENT				NEW PRODUCTS			
L-1	L-7	L-13	L-19	E-1	E-7	E-13	E-19	P-1	P-7	P-13	P-19	P-25
L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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400 Universal die casting machine. *Cleveland Automatic Machine Co.*
Circle L-8 on postcard for free copy.

Maintenance Service

A 24-page booklet, B-4766, describing a complete maintenance service for electrical apparatus can be obtained. The booklet presents a maintenance program based on the use of genuine renewal parts, repair service plants, and engineering and field service. *Westinghouse Electric Co.*
Circle L-9 on postcard for free copy.

Humidity Conditioning

Now available is an eight-page bulletin, No. K-152, which describes a number of installed applications of Kathabar humidity conditioning equipment. Seventeen industries and 43 business and manufacturing firms in which this dehumidifying equipment is used are mentioned. *Surface Combustion Corp.*
Circle L-10 on postcard for free copy.

Surface Protection

The present edition of Alodising with Alodine, revised March, 1952, describes standard Alodine No. 100 and also presents data on a recently developed grade, Alodine No. 600. *American Chemical Paint Co.*
Circle L-11 on postcard for free copy.

USE THIS POSTCARD

Tool Steel

The "Blue Sheet," just released, gives certified laboratory data on analysis, proper methods of handling and shop treatment, and complete physical properties, etc., on Alhead cold heading die steel. *Alleghany Ludlum Steel Corp.*
Circle L-12 on postcard for free copy.

Autobody Repair

An application booklet illustrating the use of "3M" adhesives, sealers and coatings in autobody repair has been announced. The 16-page booklet describes and pictures the application of weatherstrip adhesives, trim cement, felt pad adhesive, autobody sealer, body caulking, autobody deadener, glass sealer, metal filler, and "Corogard" brand chrome coating. *Minnesota Mining and Manufacturing Co.*
Circle L-13 on postcard for free copy.

Nickel Steels

"Atmospheric Durability of Steels Containing Nickel and Copper—Additional Exposures Data" is the title of an eight-page booklet that reviews recent data and literature on the effect of nickel on atmospheric corrosion in low alloy high strength steels. Observations are based on some specimens after 22 years. Comparisons of results are made for moderate and heavy industrial, marine and rural atmospheres. Beneficial effects of varying nickel and copper and other alloying elements are discussed. *International Nickel Co., Inc.*
Circle L-14 on postcard for free copy.

Aluminum Foil

In the Spring issue of the Aluminum Bulletin there is an article dealing with the use of aluminum foil as a moisture sealing material for military vehicles. *Aluminum Association.*
Circle L-15 on postcard for free copy.

Gasoline Survey

The quarterly Motor Gasoline Survey of octane number and tel content of gasoline in various cities throughout the U. S. is now available. *E. I. du Pont de Nemours & Co., Inc.*
Circle L-16 on postcard for free copy.

Surface Grinding

Grinding know-how, wheel selection, and trouble shooting are explained in a recently issued 92-page booklet, The ABC of Surface Grinding. *Norton Co.*
Circle L-17 on postcard for free copy.

Overhead Cable Conveyor Systems

Now available is a pamphlet on cable conveyor systems which points out the engineering features of the overhead cable method. Parts and specification information is provided. *Duigle-Gaboury, Inc.*
Circle L-18 on postcard for free copy.

Pump Applications

A new type of reference chart on small pump applications has just been developed. In one table, this guide lists the various types of Tuthill pumps, the services for which each is built, the performance characteristics, types of packing, styles of mounting, and features that distinguish each model. *Tuthill Pump Co.*
Circle L-19 on postcard for free copy.
(Please turn page)

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L-4	L-10	L-16	E-4	E-10	E-16	P-4	P-10	P-16
L-5	L-11	L-17	E-5	E-11	E-17	P-5	P-11	P-17
L-6	L-12	L-18	E-6	E-12	E-18	P-6	P-12	P-18

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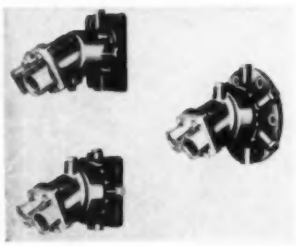
NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Fixed Displacement Pumps

Now in production are three fixed displacement pump designs which have AN approval. These are the two and three gal sizes, at 1500 rpm, and are identified as the PFA2, PFA3Y-2, and the PFA3Z-2. The



Vickers fixed displacement pumps.

latter two models differ only in the type of mounting pad provided.

Rated as 3000 psi pumps, volumetric efficiency is claimed to be 96 per cent and overall efficiency is 92 per cent. Volumetric efficiency increases as pressure is reduced. Small size and extremely high horsepower to weight ratio at rated loads and speeds are important characteristics of these accessories. The PFA2 generates 1.9 hp per lb. Pressure pulsations generated by the pumps are said to be negligible. *Vickers Inc.*

Circle P-5 on page 65 for more data

Emergency Hydraulic Hand Pump

Now being manufactured is a hydraulic emergency hand pump, classified as Model 30PA and made to AN specifications. The emergency hand pump is a manually operated single-cylinder, double acting, reciprocating piston type pump capable of developing pressure up to 3000 psi with a displacement of ¾ cu in. of fluid per cycle. It is 2¾ in. from center to center of the mounting holes. The pump is equipped with a telescoping handle which can be extended to the desired length. A significant feature is its low weight, a maximum of 3¾ lb.

This pump is operated by moving the pump handle back and forth through an angle of approximately 60 deg at the rate of 35 to 40 strokes per min. On the inboard stroke approximately half the fluid drawn into the pump during the outboard stroke is discharged through the discharge port. The remainder is left in the spaces surrounding the piston body.

Greer emergency hydraulic hand pump, Model 30PA.

On the next outboard stroke, while a fresh supply of fluid is being drawn into the pump body, the fluid around the piston shaft is discharged. Thus, fluid is discharged on both strokes. *Greer Hydraulics, Inc.*

Circle P-6 on page 65 for more data

Plastic Grommet

Now being fabricated is a special laminated plastic grommet made of fine weave canvas Dilecto rolled tubing. The tubing is cut into rings, then grooved and beveled. A diagonal slit released the built-in tension of the ring.

The grommet is claimed to be easily compressed and inserted by hand. Once in, it springs outward, tight against the edge of the hole. Material used is mechanically and dielectrically strong, resistant to high heat, hot oil, excessive humidity. *Continental-Diamond Fibre Co.*

Circle P-7 on page 65 for more data

Electro-Mechanical Mechanism

The development of a tiny aircraft mechanism that can take a weak electrical impulse and turn it into sufficient power to move a large object was disclosed recently. It was designed for moving various control surfaces on high-speed aircraft.

In addition to its ability to transform extremely weak signals into powerful mechanical energy, the device is said to have a fantastic speed of response.

Known technically as the SS hydraulic servo, it weighs approximately one lb. *Minneapolis-Honeywell Regulator Co.*

Circle P-8 on page 65 for more data

Flame-Retardant Plastic

Flame-retardant laminated plastics expected to have wide usefulness in electronic, aircraft and other applications are now being offered. The increased safety provided by use of the resin formulation is available in all standard grades and forms of Synthane plastics. *Synthane Corp.*

Circle P-9 on page 65 for more data

That's why they need

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FULL-FLOW RING SETS

TOP COMPRESSION RING HAS SOLID CHROME FACE
factory-lapped to a light-tight finish

MD-50 STEEL OIL RING HAS CHROME-FACED SIDE RAILS
The only ring with the FULL-FLOW SPRING

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Leading producer of Automatic Transmission Rings and Non-Spin Oil Rings.

The BUSINESS PULSE

Consumer Inventories Built Up by Scare Buying Have Been Substantially Reduced. Construction Has Reversed Downtrend of 1951 and Is Back to Level of a Year Ago. Cuts in Federal Budget by Congress Foreseen.

Prices Firmer in March and April

In broad outline, the business scene continues to be characterized by the same mixed conditions which have prevailed since about the turn of the year. Thus, in those industries closely related to the defense program, activity has been well sustained, while in many of the consumer goods industries operations are still appreciably below capacity levels as a result of the lagging consumer demand. Prices in general were firmer in March and April than in the first two months of the year, but no real indication of an upward tendency has as yet appeared, according to available facts at hand.

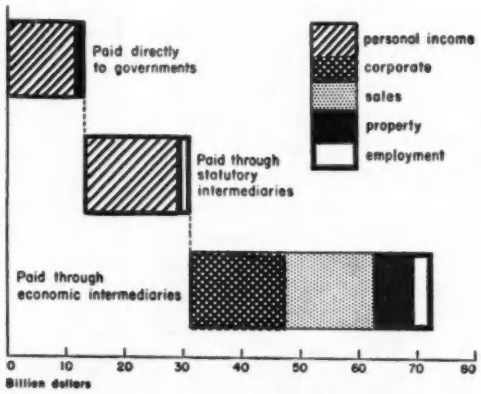
In general, consumer durables have been the hardest hit by the lag in demand. Recent price cuts for such goods as television receivers, washing machines and other appliances do not appear to have stimulated sales to any large extent, nor does the relaxation of credit controls appear to have had any significant effect. Retailers now seem anxious to have the credit controls removed altogether, and there apparently exists considerable sympathy for a suspension of price ceilings. Indeed, the Office of Price Stabilization has suspended price controls on a number of commodities currently selling below ceilings but has pointed out that suspension does not mean decontrol. The OPS has indicated that it will reimpose ceilings if prices move upward to certain designated levels.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

This situation could be transformed quickly into one of predominantly inflationary tendencies; purchasing power is available if consumers want to use it. Disposable personal income remains near record levels, and the substantial additions which have recently been made to liquid assets could be drawn upon if consumers were so inclined. It is generally believed that the consumer

(*Turn to page* 116, *please*)

This chart of the Federal Reserve Bank of Chicago shows price trends since Korea. After June 1950 raw materials jumped faster than processed goods, but since early last year wholesale and commodity prices have slumped and over-all consumer prices continued their gradual rise until recently.



Of the $75 billion in local, state and Federal taxes for 1951, nearly 90 per cent was collected by statutory and economic intermediaries. Today hundreds of thousands of employers perform the function of tax collector. The above chart is based on data compiled by the Chicago Federal Reserve Bank.

AIR BRIEFS

By ROBERT McLARREN

Hovering Tragedy

Secretary of Air Force Finletter has stated flatly that the House-approved slash of $1.6 billion in the fiscal 1953 Air Force appropriation will delay attainment of the 143-wing program until 1957 and that such a delay will produce an "extremely serious" situation. Secretary of Defense Lovett has formally asked the Senate to restore the full amount to the Air Force but informed Washington observers are wary of an economy-bent, election-year Congress. Total USAF request for the 1953 fiscal year for "aircraft and related equipment" was reduced about $150 million with the remainder being distributed, in greater proportion, among such items as construction, procurement other than aircraft, research and development, etc. While the actual aircraft procurement slash is comparatively modest, Secretary Finletter points out that the careful integration of the overall program will be destroyed and its consummation delayed into 1957, or seven years after the outbreak of hostilities in Korea. A fact regarding the 1953 budget which is not generally appreciated is that the current budget of the Air Force is still the 95-wing program of two years ago and that the 143-wing program is to start with the July 1, 1952, fiscal year beginning date.

Confusion Compounded

Despite the rigorous Air Force prosecution of the "lead time" factor, the public, through its representatives in the Congress, is still thoroughly confused. This results, principally, from the rather technical nature of the military aircraft procurement problem. For example, Finletter has stated that were he handed unlimited funds today he could not obtain 143 wings any sooner than the projected July 1, 1954, completion date—because airplanes can't be built any faster. Simultaneously, however, many Congressmen continually point to the $109 *billion* this nation has spent on the Department of Defense since the start of the Korean war with but minor increases in the standing establishment. Clincher in their economy argument is that there is, currently, an item of $73 billion in appropriations which the Services haven't even spent yet—so why ask for $50 billion more?

Hidden Results

Not readily available to the public is the fact that these huge sums have bought a substantial portion of "get readiness." For example, Lockheed Aircraft Corp. is now occupying more floor space than did the entire aircraft manufacturing industry in 1940. Lockheed's current total of 10,858,000 sq ft is nearly matched by Douglas with 9,400,000 sq ft, yet these are only two of 12 major airframe companies. Several companies already have passed their World War II peaks in personnel. These are hard, encouraging facts that even critics of the program must accept as truly significant accomplishments. But to the oversimplifiers, the question of "where are the planes?" has become a meaningless chant.

The simple, honest answer that "they are coming" doesn't satisfy the economy-criers but to serious students of the problem important results are becoming manifest. Whereas Undersecretary of Air Force Gilpatric testified three months ago that "current production is about 450 planes a month," Secretary Finletter was able to say a fortnight ago that "current production is about 600 planes a month." Expansion of the base and the initial acceleration of production are now "fait accompli." It would be tragic to tighten the financial strings—even slightly—on the program at this critical stage of the game.

New Friend

Surprisingly original and provocative proposals for solution of current international aircraft procurement problems came from a wholly unexpected source last month: Prince Bernhard of The Netherlands. Displaying an entirely unexpected familiarity with aircraft problems and uniquely sound solutions to them before the SAE National Aeronautic Meeting, Prince Bernhard pointed out that at the moment there are 4,800,000 sq ft of aircraft factory floor space standing idle among NATO members on the Continent—together with their design and production staffs of demonstrated ability. He makes the obvious suggestion that a marriage of this productive capacity with U. S. efficiency and organizational talent could create a valuable and fruitful source for the supply of military aircraft in Europe.

Responses to this suggestion by qualified U. S. aircraft industry spokesmen have generally agreed with the logic of the Prince's proposal but minimized its potential contribution to the overall problem. This obtains from the opinion that this actual productive capacity is comparatively small—even if fully organized and utilized—and that long-distance coordination of such a program would be difficult. Most conceded

(*Turn to page* 106, *please*)

COMPLETE *Engine* CONTROL

1436 SERIES
FULL AUTOMATIC CONTROL SETS

Provides full automatic start and stop from any remote pilot switch. Complete safety protection with individual signals. For all gasoline or diesel engines. Ask for Bulletin 401.

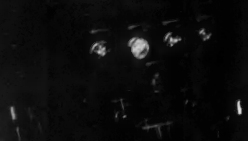
OVERSPEED GOVERNORS

To cause shutdown at any predetermined RPM and prevent damage due to excessive speed. Can be secured in any desired speed range and either manual or automatic reset. Adjustable while the engine is running. For all engines or electric motor drives. Ask for Bulletins 409 and 409A.

SYNCHRO-START *Automatic* CONTROLS

DC SOLENOIDS—
CONTINUOUS DUTY

A small rugged solenoid with a 10-pound pull over a half-inch stroke. Available for 6, 12, 24 or 32 volt DC operation. To operate any mechanism within its pulling range. Ask for Bulletin 410.



SAFETY
ALARM SETS

These controls give an alarm in case of any abnormal condition. Individual signal lights and audible alarm connection. Can be furnished combined with shut down if alarm is not heeded. Ask for Bulletin 407.

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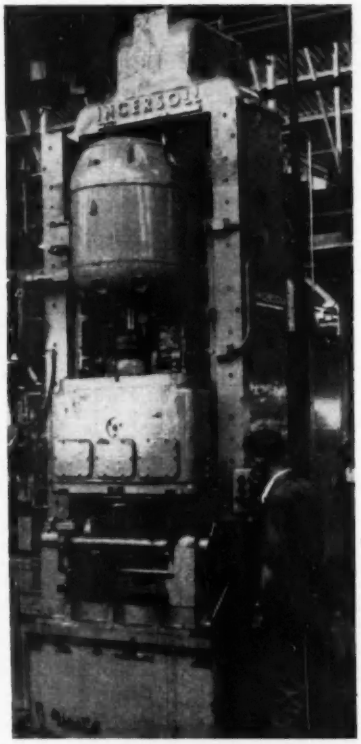
Government Policies Hit Car Sales in Australia

Motor Registrations in Australia Continue to Hold at Record High Levels But the Hectic Boom in the Automobile Industry is Slackening as it Takes the First Impact of the Government's Anti-Inflation Program.

By John Loughlin



In this setup an Ingersoll vertical boring mill is used to bore the six cylinders of the Holden engine in a single operation. Most of the machine tools and other production equipment were purchased in the U. S.

MELBOURNE, AUSTRALIA

UNTIL the end of 1951 the demand for new cars in Australia seemed insatiable with waiting lists of one to five years growing longer and longer. General prosperity and record wool prices had brought many thousands more Australians into the income brackets of those able to afford cars, even at prices loaded with customs, exchange, freight, sales tax and other charges.

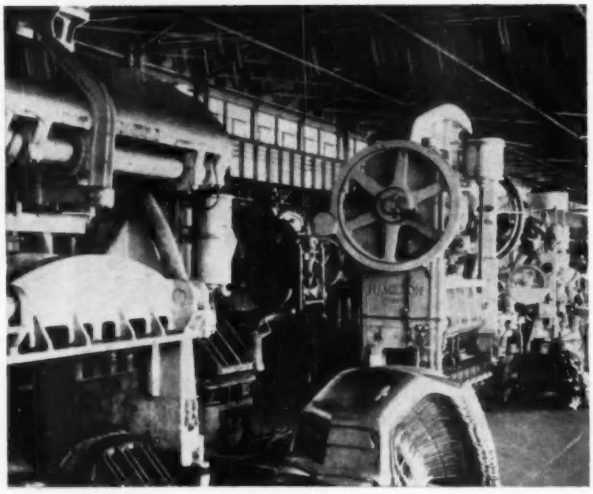
But severe credit restrictions, tighter overdraft policies, and increased sales taxes have recently resulted in a lot of cancellations, and wiped out a few waiting lists altogether.

Large financing companies now demand 40 per cent deposit on new cars and trucks instead of 33 1/3, and repayment in 24 days instead of 30 days. The Commonwealth Bank has dropped its financing business altogether and will now advance finance only for vehicles required for business.

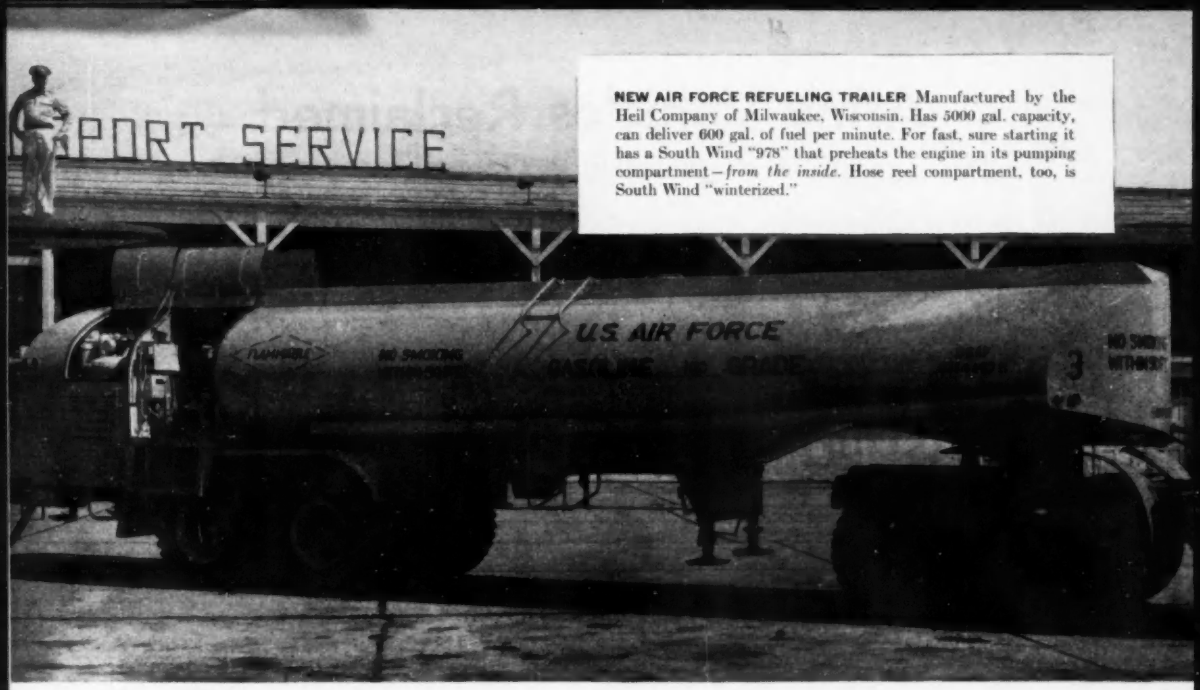
First to be affected by the credit restrictions have been the more popular lower-priced cars. The more expensive American cars and the ever-popular, locally-built Holden car from General Motors-Holdens have not been seriously affected—the buyer still has to wait years for a Holden.

Registrations of motor vehicles—cars, commercial vehicles and motorcycles—now exceed 1,500,000 in Australia, compared with 800,000 before the war. In 1951 buyers took de-

(*Turn to page* 123, *please*)



Large triple-action presses are used at the Geelong works of the Ford Motor Co. to stamp passenger car panels and roofs. Ford, General Motors, and Chrysler manufacture at least 90 per cent of the Australian-made bodies.



NEW AIR FORCE REFUELING TRAILER Manufactured by the Heil Company of Milwaukee, Wisconsin. Has 5000 gal. capacity, can deliver 600 gal. of fuel per minute. For fast, sure starting it has a South Wind "978" that preheats the engine in its pumping compartment—*from the inside.* Hose reel compartment, too, is South Wind "winterized."

NEW REO "EAGER BEAVER" Army's newest six-by-six . . . 2½ ton heavy duty utility vehicle and cargo carrier. Can travel up 60° grades or under water. A South Wind "978" defrosts windshield, keeps cab and personnel warm.

NEW "ACK-ACK" GUN CARRIAGE Mounts twin 40 mm. anti-aircraft guns. Equipped with two South Wind "978's." One for personnel heating inside, and one in the gun turret to heat the turret components.

NEW "FROST-FIGHTER" FOR MILITARY VEHICLES

Keeps Personnel Warm . . . Equipment Functioning Under Severest Weather Conditions

Adding strength and mobility to U.S. armed might—a vast new array of versatile, efficient military vehicles! And now, for improved starting power, top performance under severest weather conditions, they're carrying South Wind's famous "978" military heater as standard equipment.

Simplified in design. Compact. This rugged forced air heater preheats, heats and defrosts in any type of military vehicle—in temperatures as low as 70° below zero. Dependably safe because the combustion air system is completely separated from the ventilating air stream. Always fast acting because warm air circulation doesn't depend on engine heat.

Built to Army Ordnance specifications, the "978" has been widely accepted by the Army for its winterization program. And because of its many exclusive advantages, promises to be influential in guiding future designs for commercial car heating, too.

WRITE NOW for free information and complete details. See how easily this practical heating system can be worked into your own Ordnance program. Address inquiries to Stewart-Warner Corp., South Wind Division, 1514 Drover Street, Indianapolis, Indiana.

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PERSONNEL HEATING
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

Army Vehicles Reclaimed

in Huge Salvage Operation

of it lay uncrated on the docks until the end of the war, after which it was picked up and renovated and about 75 per cent of it returned to the States with the balance going to equip ordnance operations in Japan.

The story starts with the intense public pressure in 1945 to get soldiers home, leaving an occupation

(*Continued from page* 33)

and caretaker force behind which was entirely inadequate to care for and maintain or retransport the millions of dollars worth of equipment that had been piling up on the Pacific islands and the Asiatic mainland in preparation for a titanic invasion, which never came off because of the sudden ending of the war with Japan. As a result, this equipment which had been purchased at great cost to the American taxpayers was of necessity left to the deteriorating forces of nature with its accompanying, rot, rust, and corrosion. In addition, loss by pilferage and vandalism was tremendous and never can be estimated.

Meanwhile, the Eighth Army in Japan on occupation duty found itself pinched for even normal operating equipment, aggreavated by knowledge that no new vehicles, tanks, or other equipment would be forthcoming from the United States, pending development and production in American factories of newer and better models. That fact, coupled with the concern of Ordnance Corps officers over the tremendous quantities of material which was rapidly deteriorating and rotting away at abandoned build-up bases, led to the conception of Operation Roll-up.

Ordnance surveyed Japanese industrial plants and former military installations and found that they could be adapted to handle rebuilding and renovating of the abandoned equipment. In addition, skilled labor was plentiful and cheap. As a result, the program got under way in 1948 and extended through '49 into the early months of '50. The first step was to collect and transport the unserviceable vehicles to Japan, to be segregated and classified. Next phase was sorting and reclaiming of as many serviceable components as possible, after which equipment was ready for the rebuild operation. About 63,000 automotive vehicles were collected during the roll-up operation and brought to Japan for rebuild, of which more than 50,000 had been rebuilt by the middle of last year, with peak production as high as 216 vehicles daily.

Originally operations were centered in three major areas in Japan, but since last June have been reduced to the Tokyo-Yokohama area.

One of the significant features of Operation Roll-up and the continuing rebuild operation in Japan has been the superimposing of American manufacturing methods and techniques upon traditional Japanese industrial practice. Basically, the Japanese still are "cottage industry"

"Made for Each Other!"

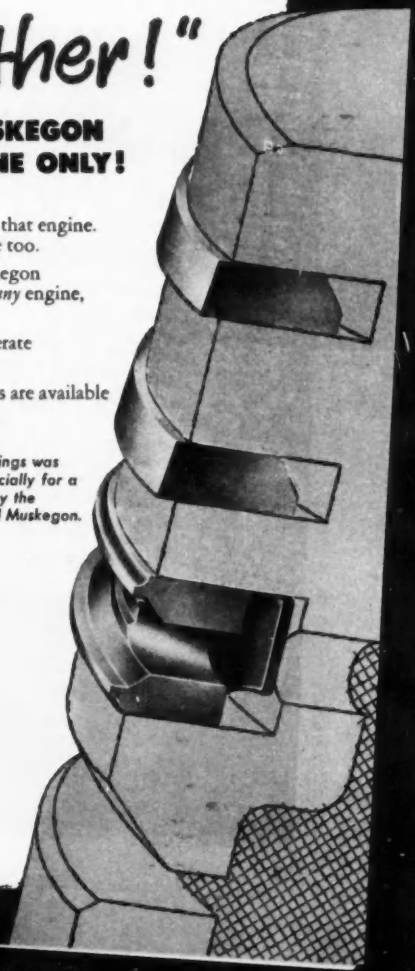
SERVICE PISTON RING SETS BY MUSKEGON ARE DESIGNED FOR A SPECIFIC ENGINE ONLY!

The *original* piston rings in a new engine are designed especially for that engine. Logically, *replacement* rings should be designed especially for that engine too.

And that is exactly the way Muskegon makes them. For Muskegon works closely with the car manufacturer to design rings not just for *any* engine, but for his particular engine only.

"Made for each other" in this way, engine and rings will operate at the very top level of performance.

These *Factory Approved* and *Factory Engineered* Service Piston Rings Sets are available only through car dealers and other authorized service outlets.



*This set of service rings was designed especially for a specific engine by the engine maker * and Muskegon.*

MUSKEGON Piston Rings

MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"

*Name on request.

Army Vehicles

(*Continued from page* 76)

minded, requiring an intensive training and adjustment program before Japanese workers, who comprise the bulk of personnel, could man the plants efficiently. Despite the size of its industrial activity, Japanese standards and methods are far below those of the United States and lack the strict tolerances and allowances required for precision parts necessary for complete interchangeability.

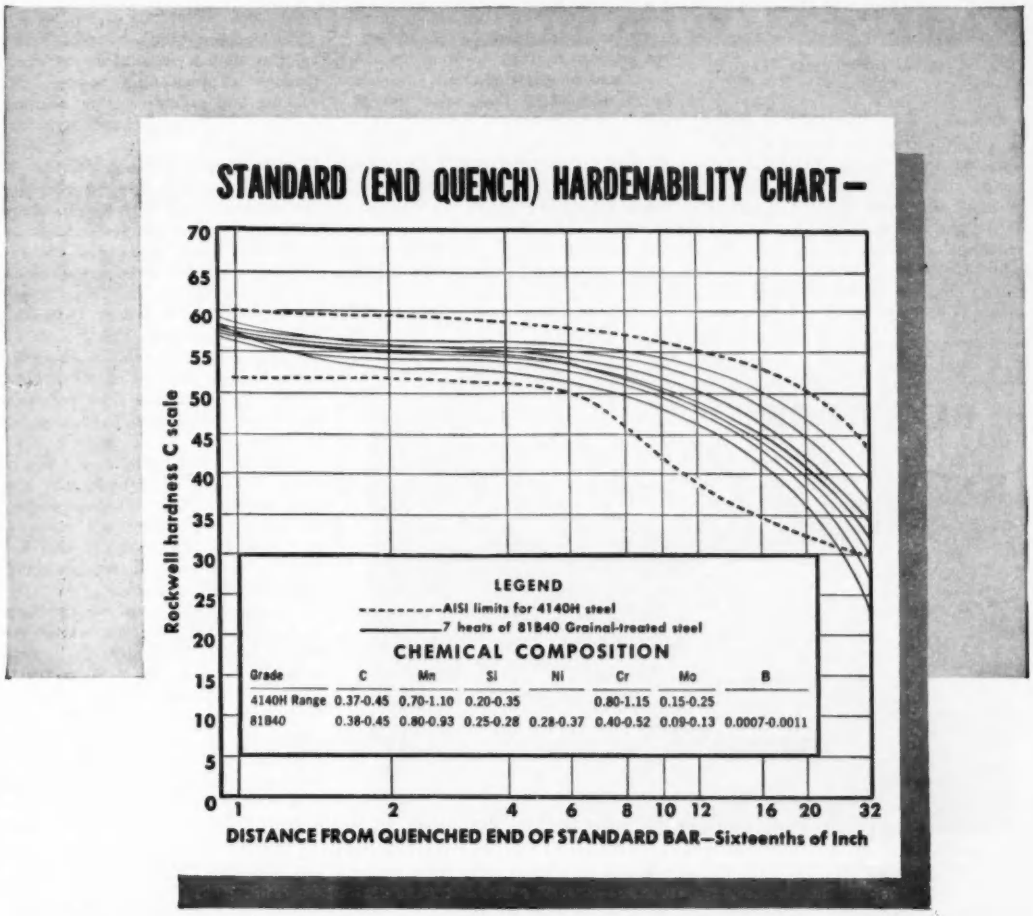
A personnel training program had several inherent Japanese practices to reverse before the workmen could become efficient. The Japanese worker, however, learns reasonably fast and when he becomes accustomed to the new methods and repetitive operations becomes an exceptionally fine workman.

Average take-home pay for Japanese workers for a 48-hr week is about $48 a month. The low labor rate makes it possible to reclaim parts that would be scrapped in the United States. Rent or taxes are not paid on the plants, and little maintenance is performed on physical facilities other than that required to keep them in operating condition. A large percentage of the machinery and other equipment used for mass production in the plants were taken as reparations from Japanese industry.

A divergence from common American practice is the low ratio of supervisory personnel to production workers. In the total ordnance activities in Japan there are 641 officers and civilian personnel who supervise the activities of approximately 50,000 workers, or an operating ratio of about 1.3 per cent executive personnel. Standard practice in American industry considers 10 per cent of operating personnel in an executive capacity as normal.

While the roll-up operation now is largely completed, the rebuilding facilities will continue to operate for the rebuilding of worn out and battle-damaged equipment from Korea and also World War II trucks, tanks, jeeps, and other vehicles shipped from the United States and Hawaii. It is much cheaper to transport the equipment to Japan for rebuild there rather than to do the job at arsenals in the United States, because either way the vehicle must be transported and ultimate destination now of much World War II equipment is the Korean theater.

(*Turn to page* 80, *please*)



Consistent Hardenability obtained in Boron Steels made with GRAINAL ALLOYS

The most common test for boron steels is measurement of hardenability by the end quench or Jominy hardenability test. Today's steel substitutions are made on the basis of similar hardenability since a reasonable prediction can thus be made of the hardness and strength of a given part.

The curves above show the relationship between the hardenability of a series of seven heats of 81B40 steel and the hardenability band for 4140H steel, which it often replaces. The 81B40 heats were made in one electric furnace shop, and the remarkably consistent hardenability shown by the curves was obtained by the use of Grainal alloy as the means of adding the boron.

Consistent hardenability means consistent strength and hardness after heat treatment, which is the aim of every fabricator. The best proof that the Grainal alloys insure this objective is found in the successful use of three million tons of Grainal-treated steels.

VANADIUM CORPORATION OF AMERICA
420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH
MAKERS OF ALLOYS VANCORAM CHEMICALS AND METALS

Army Vehicles

(*Continued from page 78*)

Ordnance Corps rebuild and maintenance facilities are located at three principal locations, the Oppama Ordnance Shops, Tokyo Engineering Works, and the Tokyo Ordnance Depot. Since each of these operations performs a specific assignment, they will be treated separately.

The Oppama Ordnance Shops are about 14 miles south of central Yokohama and were formerly a Japanese naval base and naval aeronautics research center. They cover about 370 acres and comprise nearly 1.1 million sq ft of covered floor space in 78 shops in warehouse buildings. Function is complete disassembly and rebuild of military vehicles of 2½ tons and smaller. The contractor who operates the shops under military supervision is Fuji Motors Corp., which has the function of providing personnel and supervising their activities.

Production operations consist of seven separate phases as follows:

1. *Selection and precleaning.* All vehicles found rebuildable are put through a precleaning process. Oil soaking and pressure steam cleaning together with some hand scraping, are employed.

2. *Disassembly.* Vehicles move down two assembly lines where parts are removed until only the frame is left. Subassemblies are routed to specialized repair shops, with the exception of power train units, which are transported to the Tokyo Engineering Ordnance Works Ordnance Shops for rebuilding.

3. *Chemical cleaning.* Component parts are put through an alkali bath after which comes a rinse in clean hot water, and a final bath in phosphoric acid.

4. *Repair.* All parts, except power train units, are rebuilt at the Oppama plant in special shops for individual items. They are given a primer and initial coat of paint before being sent back for assembly into the rebuilt vehicles.

5. *Assembly.* When vehicles are rebuilt they follow the same sequence and practically the same order of build-up as used in truck plants in the United States. The vehicle leaves the line under its own power.

6. *Tune-up and inspection.* Following completion vehicles are driven to a tune-up shop for adjustment and then experienced inspectors give them a thorough shakedown road test.

7. *Painting and processing.* When the rebuilt vehicle has passed final inspection it is moved to a paint shop, where it is pressure cleaned. Two vehicles are painted at once in a 12-minute cycle through air-conditioned paint spray booths and infrared drying booths.

Because of extreme internal corrosion some engine blocks do not have enough sound metal left to permit cylinder boring. In such cases new cylinder sleeves are made from seamless steel tubing and installed in the block, after which they are honed and standard pistons used.

All bearings are inspected and, if necessary, bearing races are reground and oversize rollers or balls are installed. Worn ring and pinion gear sets are put on a lapping machine and run in with a fine grinding compound so that correct gear tooth contact is obtained. In the case of worn internal surfaces on constant velocity joints, these are ground to oversize on profile grinders and oversize balls are installed.

(*Turn to page 82, please*)

Army Vehicles

(*Continued from page* 80)

Subassemblies are rebuilt on roller conveyor lines with constant gaging and inspection to insure that exacting tolerance standards are met at all times. Following completion of major subassemblies they are put on special test devices to insure that they are operating up to standard.

One noteworthy operation is the development of the process for reclaiming radiators that have previously not been considered economically repairable. Upper and lower tanks are removed by melting the soldered joints with a torch, and the radiator cores are placed in a hot caustic solution and cleaned by running a steel rod through the tubes. Strips of solder are placed in each tube and the core is then put into the tinning furnace to melt the solder. The core is taken out and surplus solder is blown out by air, leaving only a thin coating on the inside of the tubes. Fins are individually straightened by girls using gas torches and needle nosed pliers. After tanks and outlet tubes have been straightened or replaced when necessary, the radiators are reassembled and soldered.

Modern materials handling equipment and power tools are widely used in the Oppama operation. Electric and pneumatic hoists are used for all heavy lifting operations, and thousands of feet of roller conveyors are in evidence. About 94 per cent of the machine tools at Oppama were obtained from Japanese industry as war reparations.

An intensive campaign also is carried on constantly to salvage every bit of scrap metal from unusable parts of vehicles. Truck cabs and metal dump bodies beyond repair are cut up to be put through the stamping presses. Copper or steel fuel lines which cannot be repaired are cut up into sections which are welded into other lines. Broken or warped propeller shafts which cannot be reclaimed are cut up for short sections of shaft and splined ends are salvaged for use by welding to straight shaft sections.

Production Pointers from GISHOLT

TIME-SAVING IDEAS

Presented as a service to machine shops, we hope some of these interesting ideas, culled from thousands of jobs, will suggest ways to help you cut time and costs in your own metal work.

HYDRAULIC LATHES PAIR UP FOR BIG OUTPUT OF BEARING RACES

34 Pounds of Metal Removed in Two Fast Operations

Here's a setup for machining large spherical roller bearing races that may give you some practical ideas.

The job is done in two operations with the work divided between two Gisholt No. 24 Hydraulic Automatic Lathes. Together, they remove a total of 34 pounds of metal from the 86-lb. forgings of 52100 bearing steel.

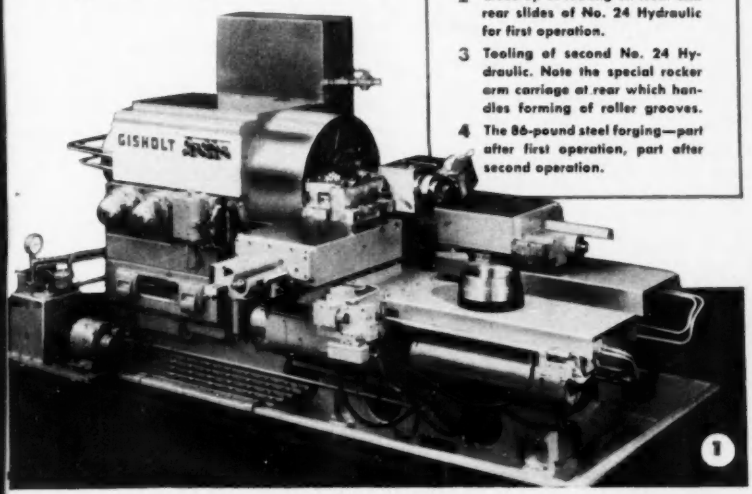
First operation: Part is chucked on the O.D. with a 3-jaw hydraulic chuck. Tools on the front slide turn up to the jaws and face, chamfer and form the radius to the bore. Boring is done from the rear slide, which has a special attachment that provides tool relief. Floor-to-floor time is only 2.80 minutes.

Second operation: A hydraulically operated arbor holds the part. Tools on the front carriage finish turn, face, chamfer and form the radius of the bore. A special rocker arm type carriage at rear tips in shaving tools to form both roller grooves. The form cutters measure 1⅞" wide. The husky No. 24 Hydraulic handles this chip load with ease, leaving an extremely smooth finish entirely free of chatter marks. Floor-to-floor time for this operation is also a brisk 2.80 minutes.

With their completely automatic cycle, these two No. 24 Hydraulics handle an interesting variety of operations with unusual speed.

PHOTO CAPTIONS

1. This No. 24 Hydraulic handles first operations on bearing races.
2. Close-up of tooling on front and rear slides of No. 24 Hydraulic for first operation.
3. Tooling of second No. 24 Hydraulic. Note the special rocker arm carriage at rear which handles forming of roller grooves.
4. The 86-pound steel forging—part after first operation, part after second operation.



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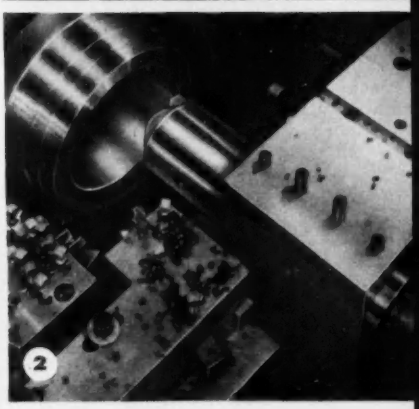
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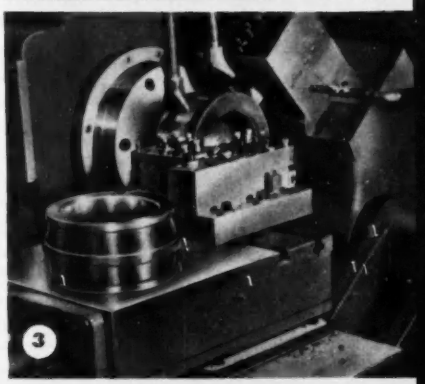
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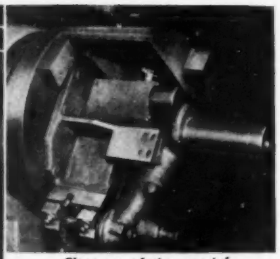
4

GISHOLT

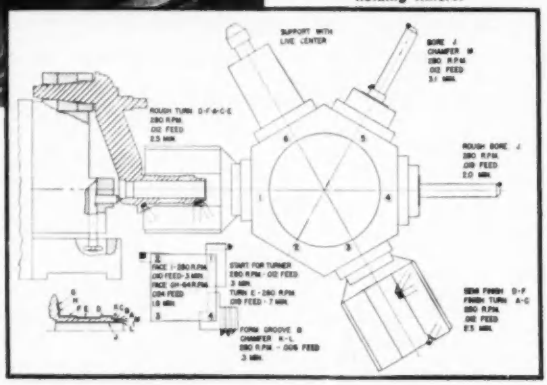
TIME-SAVING IDEAS

HOW TURRET LATHE HANDLES AWKWARD PART

The Gisholt 5L Saddle Type Turret Lathe used on this interesting job. Note turret coolant distributor.



Close-up of the special holding fixture.



Tooling layout for machining bogie axles.

Special Counterweighted Fixture Does the Trick!

This part was a tough proposition, from the holding point of view. It's a bogie axle—big, awkward and offset from the turning centerline.

The problem was solved with a Gisholt 5L Saddle Type Turret Lathe and a special counterweighted holding fixture. Fixture and part were balanced as a unit on a Gisholt Balancer to provide a faster operating speed.

The previously machined hub is used for locating and driving. Conventional bar tools on the hexagon turret handle the turning and boring of the second hub. Tools on the quick-indexing square turret form, face and chamfer, while the hub is supported with a live center from the hexagon turret.

Floor-to-floor time for the larger of the two bogie axles is 20.5 minutes. Carbide-tipped tools are used throughout, with the spindle operating at 280 r.p.m.

A special counterweighted holding fixture makes it possible to turn a difficult problem into a turret lathe job.

SPECIAL TOOLING SIMPLIFIES PISTON PRODUCTION

A Little Extra Tooling Goes a Long Way

Here's a really businesslike setup for machining a variety of cast iron exhaust pistons. The machine doing the job is a Gisholt No. 4 Ram Type Turret Lathe.

The job is quite standard except for the grooving. Simple operations from the hexagon turret include boring, counterboring, reaming and step-turning. Facing between the flanges is done by a single forming tool mounted in the standard rear tool post.

Grooving is handled from the quick-indexing square turret on the front of the cross slide. This has been wisely planned around two special tool blocks, one having tools for rough grooving and chamfering, and the other with tools for finish grooving. During the grooving operation, the workpiece is supported by an arbor on the hexagon turret.

Both carbide and H.S.S. tool bits are combined to provide maximum cutting efficiency in a minimum of machining time.

Tool setup for machining exhaust pistons. Note special tool blocks on square turret for rough and finish grooving.

Exhaust pistons fully machined on No. 4 Ram Type Turret Lathe.

Special tools on the cross slide of this Ram Type Lathe do rough and finish grooving on a variety of exhaust cylinders.

***Jet engines** present real machining problems. How turret lathes are solving many of these is told in a 4-page photo story. Write for your free copy. It has many helpful ideas.*

GISHOLT

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TIME-SAVING IDEAS

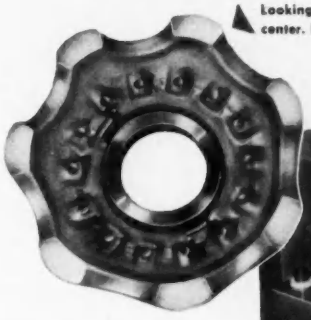
ALUMINUM FORGINGS WITH INTERRUPTED CUTS . . . NO PROBLEM HERE

Simplimatic Has Right Speeds and Feeds to Make Job Easy

Here's a job of turning aluminum with interrupted cuts. Normally it would present some real problems . . . but not the way it's worked out for the Simplimatic Automatic Lathe.

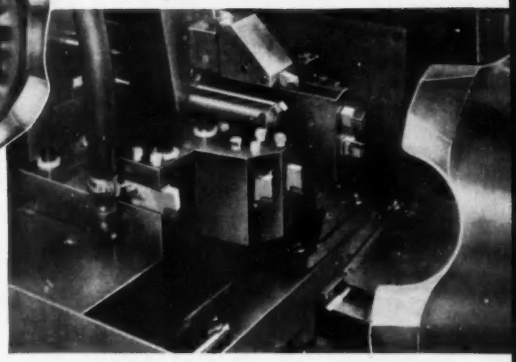
It's a bulky aluminum forging which becomes a crankcase center for an aircraft radial engine. A total of seven surfaces is machined, with two of the passes being heavy interrupted cuts. The part is located in the bore and held by an air-operated draw-back fixture. Tools on the front slide handle the recessing around the hub. Tools on the center slide chamfer the bore and finish turn the hub. Tools on the rear slide face the hub and the two sets of bosses.

Using a spindle speed of 500 r.p.m. and feeds of .010" and .005", the floor-to-floor time is an even four minutes. The parts are smooth and accurate, even with the interrupted cuts.



Looking into a machined aluminum crankcase center. Note the interrupted cuts.

Close-up, showing tooling on the Simplimatic's three slides.



The Simplimatic is ideal for this job because it permits three individual tool slides, each feeding at the best rate of feed for its particular work on this aluminum part.

FASTERMATIC MAKES FOUR PASSES TO FINISH TAPER BORE

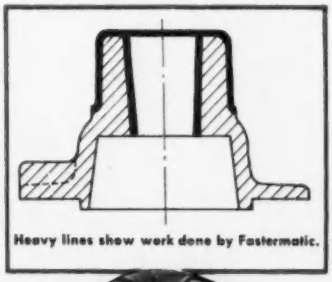
Automatic Cycle Permits Operator to Handle Other Machines

Most of the work on these cast alloy steel steering clutch couplings is in the bore. Four passes must be made through it to finish the taper.

The 2F Fastermatic has an air chuck for holding the part. Work starts with a step drill on the first turret station, cleaning out the cored hole. At the same time, the hub is rough turned and chamfered from the rear independent cross slide. On the second turret station the taper bore is roughed out with gang tools, while tools on the front cross slide finish face the hub and the flange at the base of the hub. The bore is rough taper reamed from station three and finish taper reamed from station four. Floor-to-floor time, using both H.S.S. and carbide tools, is 12.0 minutes.

With the job handled on a Fastermatic Automatic Turret Lathe, an operator is needed only for unloading and loading the parts. The remainder of the time, while the Fastermatic is going through the automatic cycle, he is free to work other machines.

All work on the hub and bore is performed automatically and in a single operation by the Fastermatic.



Heavy lines show work done by Fastermatic.

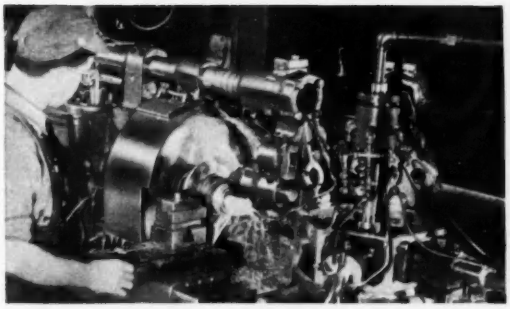


Photo shows start of automatic cycle for Fastermatic.

Complete couplings, showing taper bore and hub work.

GISHOLT

TIME-SAVING IDEAS

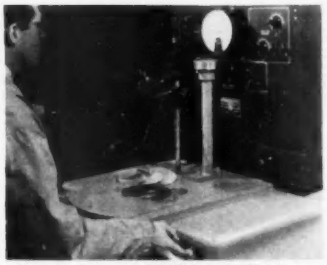
FAN BLADES BALANCED 400 PER HOUR

Vertical Machine Sets Record for Production Balancing

Here is the 1SV1 DYNETRIC Balancing Machine doing high volume balancing of small fans. Static unbalance is measured, located and corrected at a rate of more than 400 fans per hour. The operator reads the amount of unbalance directly from the meter in terms of small plugs which are pressed into the root of the blade with a hand tool.

The series of 1SV Balancing Machines are high production machines from every standpoint. They have all the newest electrical and mechanical improvements—plus a new vertical design which reduces operator fatigue to an absolute minimum and thereby increases daily output.

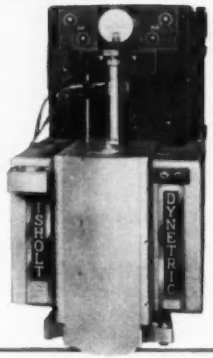
There are four models in the 1SV series—two for static balancing (single plane) and two for dynamic balancing (two plane). Write for literature.



Operators like the 1SV Balancing Machines because they are simple to operate.

At a rate of 400 per hour, the cost of balancing these small fans is insignificant when compared to the added smoothness, greater quietness and longer life of the parts.

DYNETRIC BALANCERS GISHOLT



A new booklet "Static and Dynamic Balancing," carries helpful information reprinted from the latest A.S.T.E. Handbook. Write for your reprint. Also, ask for details and starting dates of the Gisholt Balancing School, the most complete training program of its kind available.

SUPERFINISHING GIVES BEARING SURFACES MUCH LONGER LIFE

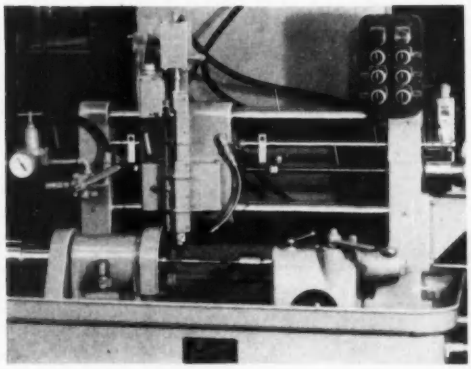
Fast Automatic Operation

The part you see loaded in this Special Model 50 Superfinisher is a stainless steel fan shaft rotor. The two bearing seals, one on each side of the large O.D., are the Superfinished surfaces.

The parts come to this machine with the bearing surfaces ground to 10-12 micro inches RMS. The operator merely loads the work, and presses a button to start this fully automatic cycle.

Rough Superfinishing on the .393" left bearing begins, with the part rotating at 350 r.p.m. Then the speed changes to 1000 r.p.m. for finishing. Completing this surface, the head rises automatically, moves to the right and comes down to repeat the operation on this second bearing. Finally, the head moves up again, part rotation and stone oscillation cease—and the automatic operation is completed. Both bearing surfaces now measure 3-5 micro inches RMS. Floor-to-floor time is just 35 seconds.

With Superfinishing, service life of these parts will be 4 or 5 times longer because the vital bearing surfaces are free from smear metal, chatter marks, grinder flats, etc.

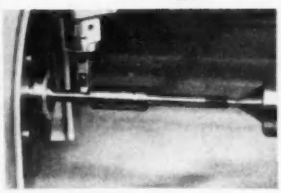


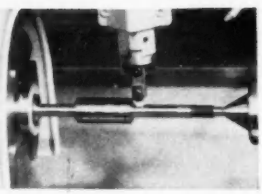
Special Model 50 used for Superfinishing bearing surfaces of fanshaft rotors.

First Superfinishing is on left bearing surface. Head then rises and moves to right to do second bearing surface.

In this quick inexpensive operation, the two bearing surfaces are brought down from 10-12 micro inches RMS to 3-5 micro inches RMS. Superfinishing pays!

Write for book "Wear and Surface Finish."





No. 5-652
589

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

Write for your copy of the new General Catalog.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

SAE Aeronautic Meeting

Has International Theme

performance comparison of a Turbomeca ducted fan versus a straight turbojet of the same family. Actual fuel flow to both engines is the same. The superiority of the ducted fan over the turbojet at low flight speeds is evident in both thrust and fuel consumption.

The case for the ducted fan in comparison with the turboprop engine is, unfortunately, not as clear cut and contains many imponderables. For speeds under 150 to 200 mph, there is no question that the propeller is an even more efficient thrust producer than the ducted fan. In the higher speed range, up to 400 mph, although the propeller engine itself may still be more economical, depending on the propeller efficiency compromises that must be made, such factors as the compactness of the propeller-less installation, the ease and rapid response of the power control, and the absence of propeller noise, weigh heavily in favor of the ducted fans.

Justification for the gas turbine over the piston engine in a four- to five-place aircraft, aside from the secondary advantages, is an unexpected one—less fuel consumption. In this particular case studied, the improvement in miles per gallon was approximately 32 per cent over a piston engine propelled airplane at the same cruising speed. The bulk of the piston engine involves large nacelle and cooling drag losses which mount rapidly at higher speeds. This is overcome by installing more horsepower with another loss increment. This cat-chasing-its-tail situation is finally resolved in the four- to five-place airplane with a piston engine of 900 to 1100 hp, in an airplane—twice as heavy for the same seating as a 450 hp ducted fan craft. An important future for the ducted fan in high-speed executive aircraft is definitely indicated.

Straight Turbo-Jet

Turbomeca has basically two engines in this category, rated at 330 and 880 lb thrust, respectively. Although producing only 1/10 of the output of military jets, these engines are also only 1/10 the size. In fact, the power-to-volume ratio is actually better than most of the announced military jet engines. A rather surprising trend, but due largely to the same

(*Continued from page* 42)

design features described previously on the other engines in the family.

The application of these small turbojets to military trainers is an obvious and probably sound one. Such a craft is currently under test at Fouga in France using two 880-lb thrust jet engines. The top speed of the airplane is about 400 mph and the loaded weight is about 5000 lb. It appears to be an answer to the problem of training jet pilots, and will probably provide a challenge to piston engines in their last strong-

(*Turn to page* 88, *please*)

SAE Meeting

(*Continued from page 87*)

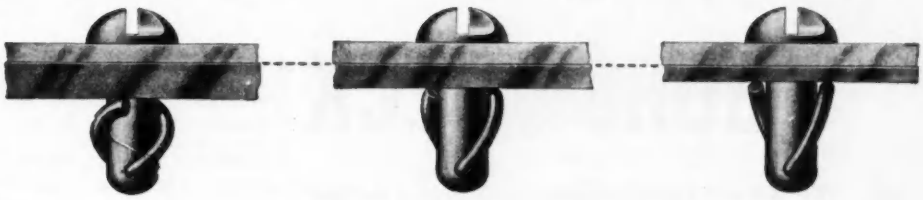
hold in the military aircraft picture.

Another highly significant application of the small turbojet is the mounting of a 330-lb thrust unit to a DC-3 airplane. The installation, engineered by the French concern SNCASO, permits an increase in airplane gross weight of up to 3000 lb while maintaining a climbing speed acceptable under the civil air regulations. It is, perhaps, difficult to see how the addition of such a small unit could be so effective in increasing pay load. Rate of climb of any given airplane is established by the power available in excess of that required for level flight. This is illustrated very approximately in Fig. 5. It can be seen that although the normal climb operation may be only slightly influenced by the use of the jet pod, single engine climb performance can be markedly increased. This is reflected directly in increased allowable take-off gross weights on aircraft where single engine performance is the limiting factor. In one airplane studied, the rate of climb was increased from 150 to 300 fpm at constant gross weight with 10 per cent static thrust augmentation. On this same airplane, if the original climbing speed were maintained, a 25 to 35 per cent increase in pay load could be realized. The advantage of the gas turbine over rocket boost is the lower cost of operation and its possibilities for use over extended climbs and en route operation.

Another interesting application for the small jet engine, though still in the speculative category, is its use as a stand-by emergency power plant in the small single-engine executive aircraft. The jet would normally be inoperative. In event of a main power plant failure, depressing a single button would automatically start the jet and bring it up to maximum thrust output in 15 to 20 sec. With the 330-lb thrust, an airplane with a normal cruising speed of 165 mph would still fly at 100 to 120 mph on the jet alone. The fuel consumption, of course, is high—one gal per min. In an average situation there would be about 20 min supply of fuel for jet operation. The cost of achieving twin-engine safety in a normally single-engine airplane would be less than 200 lb weight complete, and at not more than 25 per cent increase in airplane cost.

(*Turn to page 90, please*)

This fastener works through thick and thin!



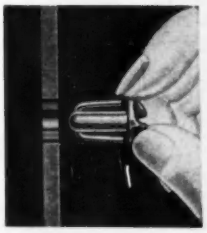
Spring-Lock—the easy-to-use removable fastener for modern designs—works whether panel thicknesses run over or under specifications! Spring wire deflects automatically to handle greater or lesser thicknesses. Spring-Lock's design flexibility makes it more than a fastener: it can be adapted as a shelf support, door strike, knob or any similar panel-mounted device. Many standard shapes and sizes of Simmons Spring-Locks are available from stock.

SIMMONS FASTENER CORPORATION
1749 North Broadway, Albany 1, New York

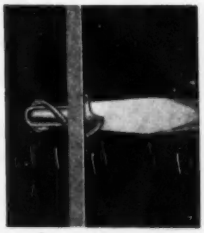
Simmons

Spring-Lock • Quick-Lock • Roto-Lock

HERE'S HOW SPRING-LOCK WORKS



1. *Insert fastener.*



2. *Half-turn locks it in place.*

With production costs on the uptrend, you can figure on Spring-Lock as an assembly time and money-saver, because:

- **Installation is BLIND**
- **Installation is EASY: no special tools are needed**
- **Installation is QUICK: a half-turn locks it in place**
- **Installation is SECURE: the *spring* steel *locks* the fastener, resists vibration**

Send for details and samples, or write us about *your* fastening problem.

SAE Meeting

(*Continued from page* 88)

Uses of Titanium in Turbojets

By H. H. Hanink
Wright Aeronautical Div.,
Curtiss-Wright Corp.

THIS discussion deals with the potential uses of titanium in aircraft gas turbines and refers to components common to all engine types, since security regulations do not permit discussion of the internal parts of any particular engine.

Beginning with compressor rotor disks, we are interested principally in yield strength versus temperature as the most important general design criterion for determining the suitability of available titanium alloys for these parts.

While temperature rise through the compressor varies from one engine to another due to compression ratio variations, a range of possible part temperatures from below zero to as high as 1000 F is of general interest. Figure 1 compares the 0.2 per cent offset yield strength of three titanium alloys with two alloy steels heat treated to properties typical of steel disks, and one high strength aluminum alloy with

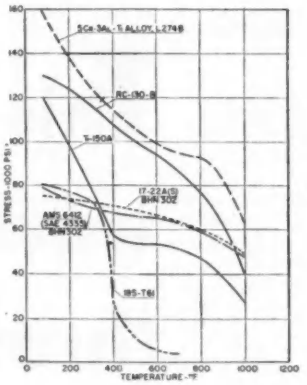


Fig. 1—Comparison of the 0.2 per cent offset yield strength of potential compressor disk materials versus temperature, adusted to the density of titanium.

good heat resistance. All properties have been adjusted to the density of titanium. On the basis of short time tensile strength, the titanium alloys compare favorably with the alloy steels. The aluminum alloy becomes inadequate beyond about 350 F. However, short time strength comparisons give an unduly favorable picture of titanium alloy properties, since unlike steel, and even at room temperature, these alloys show relatively high creep rates for stresses as high as the 0.2 per cent offset yield level. Figure 2 indicates the relationship between the same titanium alloys noted in Fig. 1 with respect to the stress to produce 0.5 per cent creep in

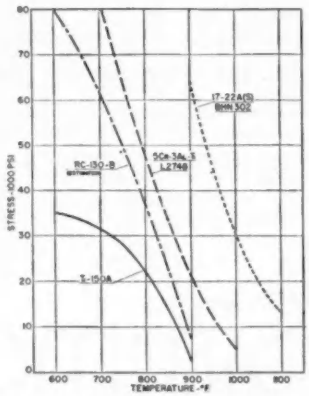


Fig. 2—Comparison of stress to produce a total plastic strain of 0.5 per cent in 1000 hr versus temperature for a heat resistant ferritic alloy and three titanium alloy alternates.

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SAE Meeting

(*Continued from page* 90)

1000 hr at temperatures from 600 F through 1000 F. In contrast to any alloy steel which can be used on the basis of short time tensile properties through at least 750 F, none of the titanium alloys shown appear to offer suitable creep strength for compressor disks much beyond 700 F. Even then some of the weight advantage over steel may have to be sacrificed, depending upon the efficiency of the original design of the steel disks and the minimum section size to which a steel disk may be machined under practical conditions.

In spite of less than full returns from substitution of titanium alloys for steel, it has been found possible in a typical compressor of advanced type to save 121 lbs from rotor disks alone, providing that titanium is also used to replace steel in rotor blades, thus lessening disk stresses appreciably.

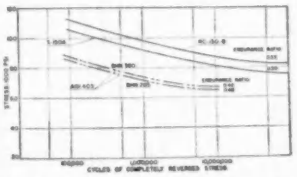

Fig. 3—R. R. Moore rotating beam fatigue curves comparing a typical compressor blade steel with two titanium alloy alternates in the polished condition.

In considering the use of titanium alloys for compressor blades, fatigue characteristics play a dominating role because of concern over the effects of blade vibration. However, as for compressor disks, creep strength is also of importance due to bending loads on stator blades and both bending and centrifugal loads on rotor blades. It is considered reasonable to estimate that about 700 F to 750 F is a limiting temperature for the use of titanium alloy compressor blades, based on creep characteristics, even though blade length, and generally blade stresses, diminish toward the high temperature end of the compressor.

As in the case of connecting rods for reciprocating engines, the apparent tendency toward notch sensitivity of titanium alloys as compared to alloy steels points up the necessity for considerable care in producing titanium alloy blades with good surface finish. Well polished blades should provide good fatigue strength as noted in Fig. 3, where fatigue

(*Continued on page* 96)

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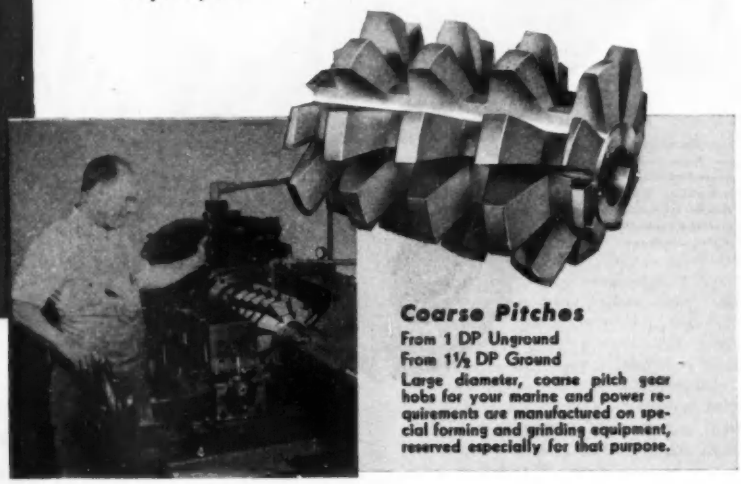

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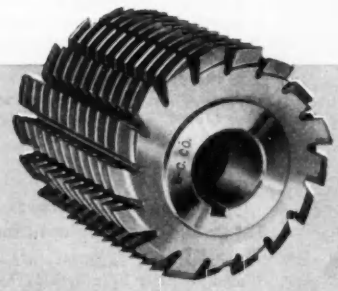

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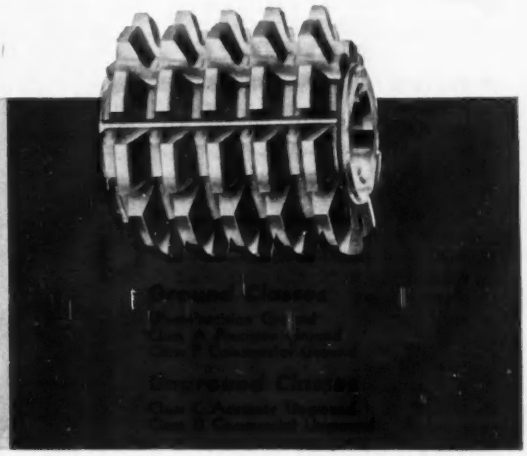

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METAL CUTTING TOOLS SINCE 1908

SAE Meeting

(*Continued from page 92*)

curves for two titanium alloys are compared with a typical stainless steel used for compressor blades.

The apparently detrimental effects of conventional shot peening practice on titanium may also imply that titanium blades may be overly sensitive to damage from nicks and scratches in handling or engine operation.

On the plus side, and in addition to their good weight/strength ratio and excellent corrosion resistance, titanium blades may actually be subject to lower fatigue stresses than steel because of their lower elastic modulus. While amplitude of vibration would increase over that of steel for the same exciting conditions, it would probably not reach a point where bending stresses would be equal to those for steel blades.

Commercially pure titanium may find such uses in turbo-jets and turbo-prop engines as combustion chamber or compressor housings, bearing supports and heat shields fabricated from sheet metal. As compared with the use of carbon steel instead of stainless for alloy conservation, titanium is lighter, also non-strategic, and has no need for a protective coating. Through 600 to 700 F, it may usually be substituted for either carbon steel or stainless with a net saving in weight. Creep properties, even at low temperatures, may control the design stress limits for titanium, and in some cases where sheet metal structures are designed primarily for stiffness, the low modulus of titanium may be a further limitation to full weight savings.

Commercially pure grades are readily welded and formed. Flash welding has also been shown successful on a commercial scale, so that there is no technical obstacle to the fabrication of potential sheet metal engine parts which typically require welding of formed sheet metal to integrally forged or rolled and flash welded flange rings.

French Tires Import Meets Opposition in Mexico

The recent permission granted by the Mexican government for the import of 36,000 tires manufactured in France has run up against the concerted opposition of several national tire companies. These firms have bitterly opposed the move and have succeeded in obtaining an injunction against the importer which prohibits him from placing the tires on sale.

Trailmobile Constructs a New Canadian Manufacturing Plant

Production facilities in Canada are said to have been trebled by the construction, in Scarborough, Ont., of a new manufacturing plant for Trailmobile Canada, Ltd., a subsidiary of Trailmobile, Inc. The plant, which will serve five factory branches in Canada, as well as distributors throughout the Dominion, is reportedly the first Canadian factory to be designed specifically for commercial truck-trailer production. Covering 33,000 sq ft, it provides for multiple production lines with special emphasis laid on economical materials handling.

White to Build Regional Headquarters in West

White Motor Co. has announced that it plans to start construction soon of a new $750,000 regional headquarters building in San Francisco, Calif. The new structure will contain coast regional offices and San Francisco branch sales and service facilities. A repair shop, machine shop, and a parts warehouse will also be provided.

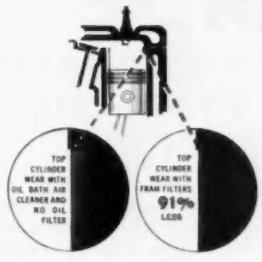
Actual Tests Prove:

FRAM FILTERS CUT ENGINE WEAR

Bearing Wear Test

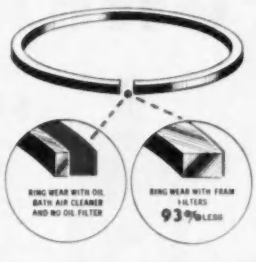
There was 95% less metal (by weight) worn from the bearings of the Fram-protected car.

Top Cylinder Bore Wear Test



There was 91% less increase in top bore diameter in the cylinders of the Fram-protected car.

Ring Wear Test



There was 93% less wear (measured by ring gap) on the rings of the Fram-protected car.

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IN DEXTER, MICHIGAN, continuing research studies prove significant savings of engine life with the use of improved filter protection under high-concentration dust conditions. The charts above represent results obtained from recent tests using ordinary protection (oil bath air cleaner and no oil filter) and heavy-duty protection (Fram Carburetor Air Filter and Fram Oil & Motor Cleaner with Filcron Cartridge). New engines were used under identical controlled conditions for each phase of testing. Recent road tests and engine stand tests indicate these savings as representative of those obtainable under actual driving conditions. Your engines deserve Fram Protection.

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Austin Assembly Plant

(*Continued from page* 45)

and suspended through an electrostatic spray painting system. Drying ovens follow, and on emerging from this the chassis are again lowered to the track to enter the Wakefield lubrication booth, where oil and grease are supplied under compressed air.

At this point of the assembly tracks the body conveyors come in, and the bodies are lowered and correctly placed automatically. The following stages are the usual ones of an assembly line, comprising the fitting of wheels, connecting up steering gear linkage, positioning seats, adding water and gasoline, cleaning and final inspection.

The three main overhead conveyors supplying the main assembly line run through a 1000-ft tunnel, 20 ft below ground, connected with other parts of the works and crossing the four assembly lines at different points. The units are brought up by elevators and transferred to the overhead elevators in the assembly shop. Total length of the conveyor system is 16 miles, with connections to the control room by 100 miles of cable. Its load capacity is more than 700 tons. All movements on the assembly line are flashed to the control room, so that should any fault occur on any part of the system it is immediately brought to the attention of this center.

Production planning is on the punched card index system, the production schedule being translated into these punchings, which are sorted automatically by machines. To give a certain amount of flexibility, blank cards are inserted at times, this meaning a blank jig on the track and a corresponding blank on the conveyor. If it becomes necessary to accelerate the schedule, the blank card can be withdrawn and a punched card put in its place.

Briggs Sales at Peak As Net Declines

Although net sales of Briggs Manufacturing Co. last year increased 12 per cent to a new all-time high, earnings showed a drop of 34 per cent because of high manufacturing costs and taxes. Net profit last year was $10,957,517, compared with $16,583,276 in 1950. Despite restrictions and Federal controls in the second half of last year, Briggs shipped more automobile bodies and plumbing fixtures than at any other time in its 42-year history, resulting in new sales of more than $381 million.

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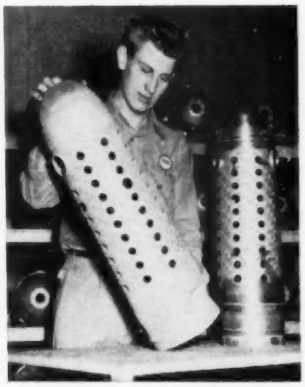
PLANTS: Kelsey-Hayes Plants in Michigan (4), McKeesport, Pa., Los Angeles, Calif., Davenport, Iowa, Windsor, Ontario, Canada.

Rosslyn Metal Undergoes High Temperature Tests

A RECENTLY developed lamellar material is expected to increase performance and service life of jet engines by providing heat-resisting alloys with better thermal conductivity. Called Rosslyn metal, this composite sheet material is a development of American Cladmetals Co. To test its high temperature behavior in jet and piston engine applications, the development laboratories of Ryan Aeronautical Co. are building combustion chambers, afterburner vanes and exhaust headers of Rosslyn metal.

With the widely-separated characteristics of melting point, tensile strength and hardness, it is obvious that formation of copper and stainless steel into a composite material is difficult. When metallurgists demonstrated that lamellar sheets of stainless steel could be bonded to both sides of a copper core, American Cladmetals Co. was organized to produce the new material.

Blending the excellent heat-conducting qualities of copper with the strength and durability of stainless steel, Rosslyn metal is said to have the highest thermal conductivity of any heat-resisting material. The laminated sheets actually have greater lateral conductivity than pure copper under some conditions of service.



Here are two jet engine combustion chambers which have been fabricated for experimental purposes. The standard chamber (right) will be compared with the Rosslyn metal chamber (left) under actual operating conditions.

Even at temperatures of 1500 F., lateral conductivity compares favorably with pure copper—which would of course oxidize to destruction if exposed directly to such heat.

Rosslyn metal has a comparative thermal conductivity of 57.2 per cent, based upon copper's 100 per cent. When heat penetrates any point of its thin stainless steel outer walls, the copper core quickly and uniformly conducts it throughout the entihe sheet. This avoids hot spots because heat will penetrate the thin stainless steel sheet in a matter of a second and the copper will almost immediately spread it over a distance of at least 1000 times the thickness of the cladding material.

Such good thermal properties may substantially improve performance of high temperature components by eliminating stresses which are incurred between hot, expanded areas and

(*Turn to page* 105, *please*)

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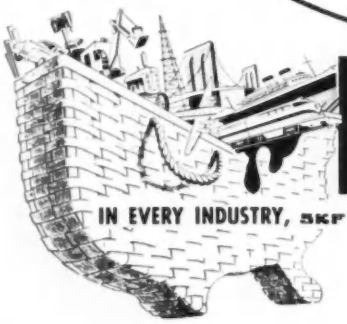

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Rosslyn Metal

(*Continued from page* 102)

the surrounding cooler metal. These stresses can produce ruptures in the metal and are greatly aggravated by poor thermal conductivity and high coefficients of expansion.

Jet engine components and exhaust manifolds must operate at extreme temperatures ranging on the high side from 1300 to 1900 F. Combustion chambers, transition liners, tail cones and exhause systems are fabricated from alloys which have high corrosion resistance but inherently poor heat conductivity. With copper rated at 100 per cent, stainless steel would receive 6.1 per cent in thermal conductivity. The effects of hot flame impingement plus poor thermal conductivity, encountered under service conditions, tend to cause warping and buckling of the thin-walled structures and are limiting factors in their design.

In service, temperature variations of as much as 1400 F have been observed with some of the alloys used. Under similar conditions, alloys of higher conductivity have exhibited a differential of only 400 to 450 F.

To test the advantages of Rosslyn metal combustion chambers, Ryan has fabricated them from two types—321 stainless steel clad and 1010 mild steel clad Rosslyn metal. These chambers are being service tested and the results will be compared with those obtained from standard chambers.

In the piston engine field, Ryan has buile exhaust system headers from 19-9DL stainless steel clad Rosslyn metal and these components have been placed on actual airliner test installed on 3500-hp Pratt and Whitney R-4360 Wasp Major power plants. Their performance will similarly be compared with the standard 19-9DL exhaust header sections.

Other high temperature elements, such as afterburner thermocouple vanes, are being built and tested by Ryan. These units employ Rosslyn metal clad with Inconel.

Rosslyn metal can be handled in production in much the same way that the stainless steel or Inconel material alone is processed. It can be formed, welded, machined and spun without difficulty if special attention is paid to its particular characteristics.

In addition to saving scarce alloys, Rosslyn metal offers reduction in weight. This is accomplished by taking advantage of the lateral heat

Rosslyn Metal

(*Continued from page* 105)

spreading qualities of Rosslyn metal and using lighter gages than would normally be possible with metals having poor thermal conductivity. Rosslyn metal designs would not have to specify extra heavy gages in order to combat the ravages of hot spotting. Sheet thicknesses with sufficient strength for the application would be the limiting factor in going to lighter material.

For purposes of approximation, it has been determined that the percentage of reduction in rupture strength at 1500 F of Rosslyn metal over solid stainless steel is about half of the percentage of copper in the material. For instance, if the copper content is 30 per cent, rupture strength reduction at 1500 F is about 15 per cent.

Confirmed laboratory data show that the strength of Rosslyn metal sheet at temperatures up to 500 F is at least equivalent to that of a sheet of solid stainless steel having a thickness equal to the Rosslyn metal sheet less two-thirds the thickness of its copper core. For temperatures ranging between 500 and 1500 F, the two-thirds factor becomes one-half, because Rosslyn metal is relatively stronger at these higher temperatures. Thus, with standard 30 per cent copper core Rosslyn metal, 85 per cent of the total gage may be used in design at the rated strength of the cladding at temperatures between 500 and 1500 F.

AIRBRIEFS

(*Continued from page* 72)

only that a direct licensing agreement —with the European companies handling their own production details—is probably workable and plans are already well along on the licensing of the Republic F-84 *Thunderjet* for European production.

Most critical response pointed out that idle aircraft production capacity in Europe lay at the door of bungled planning at the government level rather than any inherent defection of the plants themselves and that setting this right, through present NATO machinery, will virtually automatically cure the trouble. None evinced any interest in the design talent available other than the ready availability of jobs in the U. S. for any European designers willing to make the trip. But Prince Bernhard has proved himself a well-qualified observer and a new friend of the aircraft manufacturer.

Still Big Sticks

While the first flights of the two largest jet aircraft in the world (Boeing XB-52, Convair YB-60), which occurred within hours of each other after five years of work, represent easily the most significant technical accomplishment of the industry to date, it is notable that these magnificent aircraft have attracted little, if any, notice in the press or among the public.

In an age of miracles it is difficult to attract attention to a miracle. The debut of the Boeing XB-52, the most advanced aircraft of any description ever designed, hardly bares comparison with the debut of the Boeing XB-47 *Stratojet* bomber less than five years ago—yet the two are as David and Goliath in comparison. Although heavy security wraps on both projects prevented the usual energetic company exploitation, the impression is inescapable that a public hypnotized by the guided missile feels little enthusiasm for these "old-fashioned"

AIRBRIEFS

(*Continued from page* 106)

aircraft. Yet the giant XB-52 *Stratofortress* already has been ordered into production and will reach squadron service in early 1957. This long-range program suggests strongly that the USAF is firm in its determination that the piloted, fixed-wing bomber will continue to be our "big stick" for another decade, and a continuing deterrent to aggression.

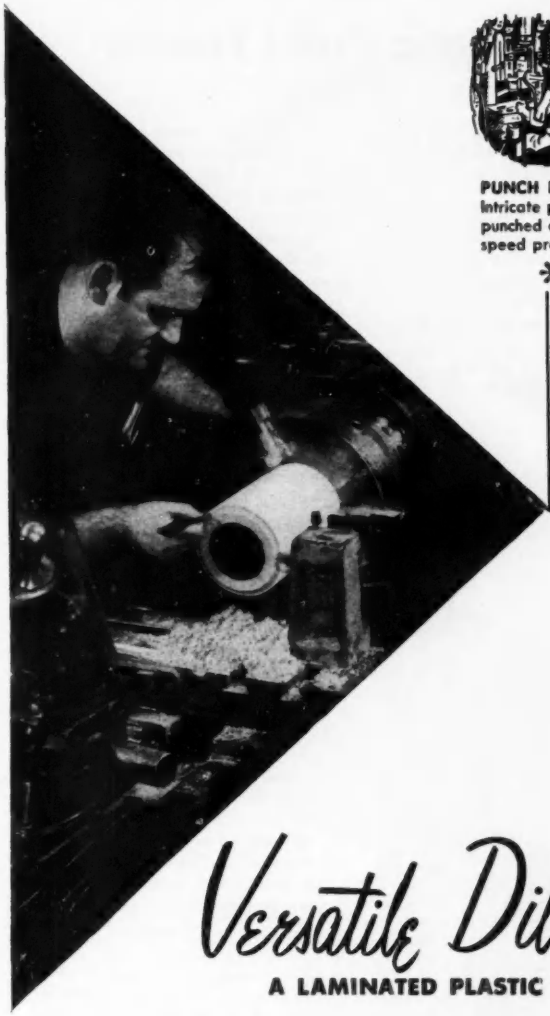
The technological facts may have caught up with bigness in bombers, however, and the Air Force has admitted that the B-52 will be equipped for in-flight refueling. Since its giant Pratt & Whitney J57 turbojet engines use fuel at a rate five times that of a comparable piston engined bomber, it seems most unlikely that the new monster has the intercontinental range of the B-36 it is scheduled to replace. This may well explain the fact that the USAF will be operating more bases overseas by the end of this year than it is operating in the continental United States. Never before has our own or any other air force in the world had more bases out of the country than within.

'Copter Airline Delayed

The rapid approach of the beginning of scheduled passenger helicopter service in the U. S. has slowed drastically with the crash of the first Sikorsky S-55 passenger helicopter delivered to Los Angeles Airways. The airline has been operating scheduled air mail service in the Los Angeles area for more than three years and was certificated for passenger operation last fall. Service was to begin shortly after delivery of the 10-passenger S-55. However, during a brief hop across Los Angeles International Airport, the tail rotor of the machine came ungeared and the giant craft fell several hundred feet to the ground, destroying the rotor, landing gear and severely damaging the fuselage. The damage will require factory repair resulting in an "indefinite delay" in inauguration of the service. Britain has previously pioneered passenger helicopter service and it is now in use in Belgium.

Old Stuff

The operation of jet fighters from carriers has been a regular feature of the U. S. Navy for four years now —so regular as to no longer attract even passing interest. The full degree of this pioneering achievement



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is brought home by the fact that the second nation in the world—Great Britain—has just placed its *first* carrier jet fighter squadron in full service. The new *H.M.S. Eagle*, which is the same size as our Midway-class carriers, is now equipped with Vickers Attacker jet fighters. The U. S. Navy launched carrier-based jet fighters into Korea at the start of the conflict and has operated them full time ever since, with casualties so low as to have left unaffected the Navy-wide accident rate of 1-2 per cent per month.

Automatic Press Feeder

(*Continued from page* 43)

right hand end of the conveyor. The conveyor, in turn, transports the work to the left in position for pick-up at the next press.

The solution of one of many mechanical handling problems incident to automatic operation of a line of presses is well exemplified by the turn-over mechanism which is fitted in the conveyor between the second and third Lodac units in Fig. 1. This is illustrated in closeup in Fig. 2. Here it is necessary to reverse the stamping for final piercing and trim at the last press. The left hand, Fig. 2, deposits the stamping onto the fixture at the left, at the loading end of the conveyor. This is mounted on an arm off the top gear. At the proper moment, this gear is moved, by an air-operated Schrader cylinder, rolling the gear about the mating gear and thus effecting a full 180-deg. turnover of the stamping. Actuation of the roll-over mechanism is another of the actions controlled by the Lodac unit.

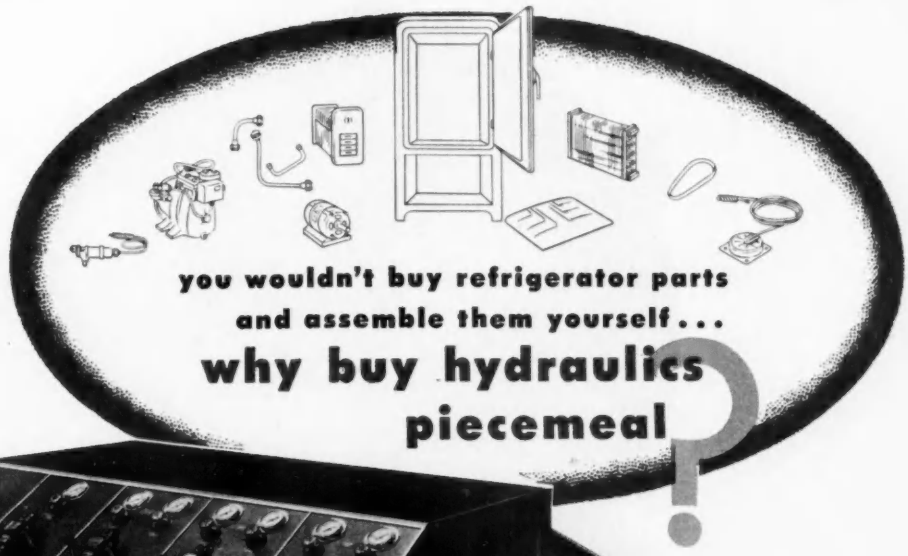
It so happens that the installation described here employs mechanical presses. Consequently, each press is tripped automatically by means of a Schrader air cylinder mounted on the side of the press. This too is automatically controlled by Lodac.

Fig. 2 also illustrates the means for positioning work at each press within reach of the grasping fingers. The terminal end of the self-contained conveyor to the right of the Lodac cabinet is fitted with a horizontally-positioned Schrader air cylinder. Cups are delivered to the end of the conveyor within the channel over the belt. Then at the proper moment the air cylinder is actuated to push the cup forward on the belt within reach of the mechanical hand.

With this description of Lodac operation in mind, it may be observed that mechanization of press equipment has been given enormous flexibility. For one thing, it is perfectly feasible to mechanize an existing setup of presses—of any required number —without physical change in location. The presses may be unevenly spaced. In that event it is a simple matter to accommodate for uneven spacing by introducing conveyor sections of proper length. If the presses are lined up unevenly, or turned with respect to the plane of another press, the conveyor section can be installed accordingly.

It is not necessary, when Lodac is employed, to demand synchronization of speed of individual presses. Since the Lodac unit will synchronize its action with the individual press, the only effect of differences in press speeds will be to accumulate some extra stock at one end if press action is slow; or have a gap in feeding when a

(*Turn to page* 115, *please*)



you wouldn't buy refrigerator parts
and assemble them yourself . . .

why buy hydraulics piecemeal

VICKERS custom built

Hydraulic Power Units

Improve and Simplify Hydraulic Design

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Reduce Installation and Maintenance Costs

You *could* buy a motor, compressor, coils, valves, tubing and cabinet separately and put them together to make a refrigerator of a sort. But you wouldn't want the trouble and expense, and you wouldn't want to take the responsibility for successful operation. You would rather buy a complete refrigerator . . . get the manufacturer's know-how and have him take undivided responsibility.

Then, why buy hydraulics piecemeal when a Vickers Custom Built Hydraulic Power Unit offers so many more advantages? It is built to meet your individual requirements. All necessary pumps, valves, intermediate piping, oil reservoir, motors, controls, etc. are in one self-contained "package". It includes all needed accessories such as oil filters, air cleaners, oil level gauges, fittings, etc. Hydraulic connections are grouped in a conveniently located manifold.

Simplified hydraulic design, improved appearance, and substantial savings in installation and maintenance costs are the result. A most important advantage to both machine builder and his customer is Vickers undivided responsibility for the entire hydraulic system. For further information ask for Catalog 5000.

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

WHAT *Life-Lines* REALLY DELIVER IS MORE SERVICE...LESS SERVICING

What *Life-Lines* really deliver is

...more service
...less servicing

"We can't afford equipment breakdowns. We manufacture ice cream making machinery and operate franchise stores throughout the country. Store operators know very little about maintenance. We *must* select equipment that assures trouble-free performance with minimum maintenance. That's what Life-Lines give us. That's why we standardize on them."

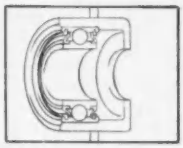
The above statement by the chief engineer of an eastern manufacturing plant tells the Life-Line story best. Summed up it means more service, less servicing with Life-Lines.

Take the Life-Linestarter®, for example. Contacts last longer because exclusive "De-ion®" arc extinction snuffs out arcs fast... reduces contact pitting. Simple seesaw balance of clapper prevents accidental opening; kickout spring prevents accidental closing. Compare with any other starter and see why Life-Linestarters offer *more service with less servicing.*

The Life-Line motor's advance design completely eliminates periodic lubrication. Pre-lubricated factory-sealed ball bearings need no greasing attention. Throw your grease guns away! Further, steel construction cuts breakage from rough usage. Superior insulation and winding techniques lengthen electrical life. On-the-job reports of a half million Life-Lines show why you get more service with less servicing.

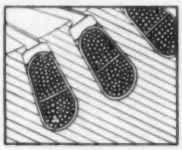
It costs no more to get Life-Line performance. Ask your Westinghouse representative for details or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-21684



MOTOR

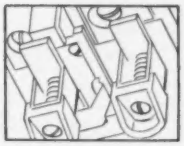
Needs no lubrication. Pre-lubricated factory-sealed bearings eliminate troubles due to under or overlubrication, dust and dirt.



Cuts winding burnouts. Pear-shaped slot design eliminates pockets. No corner voids remain to collect dirt, moisture.

STARTER

Never Jams. No sliding surfaces to wear—no sticking—no jamming—nothing to wear or replace.



Never needs filing. Silver-to-silver contacts eliminate filing. Discolored silver maintains high conductivity.

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the assurance of more-than-ordinary dependability in the design, manufacture and performance of boots, gaskets, diaphragms, packings and similar

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then Chicago Rawhide's long experience (since 1878), exceptional engineering facilities, and strict quality controls are of particular importance to you. To meet the special requirements that

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for the protection of your mechanisms, the designing of the leather parts, the careful selection of top grade steer hides, and the mass production of all

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mechanical leather products, are aimed toward this result: uniformly high quality that will deliver continuous, dependable performance under the most severe operating conditions.

The cooperative research and engineering services which C/R has provided in producing special Sirvis leather parts for leading manufacturers, are also available to you. We will be pleased to send you any further information you wish. Catalog on request.

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Automatic Press Feeder

(*Continued from page* 110)

press is considerably faster in action.

The latter case is well handled by the action of the electronic memory circuit mentioned earlier. It will be recalled that if the right hand fails to pick a part, the cycle remains uninterrupted. The arms will complete a full cycle without handling the work but will pick up work at the next cycle without interruption.

Another element of flexibility vital to this type of installation is the provision of quickly changeable fingers for the grasping hand. The fingers are made to fit the shape and size of the work at each station and can be readily changed whenever the work is changed. For example, in Fig. 2, the fingers on the left hand have a smaller diameter than those on the right hand.

Moreover, despite the complete automaticity of the setup for a given job, it can be readily and quickly changed over for an entirely different kind of part by changing fingers, changing the cycling of the Lodac cabinets, and by making adjustments in the conveyor feeding mechanism.

From the standpoint of operating economy, it may be noted that a battery of presses can be fully mechanized for automatic operation without operators at each press. It becomes safer to operate presses at higher speeds, since mechanical loading and unloading can be synchronized with the speed of the press at rates beyond the capacity of an operator. On the present installation, presses are being operated at about 720 strokes an hour. With further experience, it is anticipated that this line can be tuned to operate at 1000 strokes an hour.

Aluminum, Ltd., Expands Facilities in Jamaica

An important step to help meet defense requirements for aluminum is being taken by a 150 per cent expansion of Aluminium, Ltd., bauxite-alumina production facilities in Jamaica. Under the new program, the company's Jamaica alumina plant will have its planned capacity increased from 200 short tons to 500 tons per day. Further enlargement to 740 tons per day is planned as a future development.

The BUSINESS PULSE

(*Continued from page 70*)

inventories built up in the waves of scare buying that swept the country after the Korean war have been substantially reduced, and this indicates to many that the present high rate of saving will not be maintained. The current rate of saving is running close to eight per cent after personal income taxes. As compared with a rate of four per cent in 1949, this appears abnormally high. Even conceding the likelihood that the pattern of consumer expenditure and saving will change, however, the timing remains highly problematical. According to the predictions which most analysts were making six months ago, an upturn in expenditures is long overdue.

For the present, the growth in outlay for national defense is the strongest stimulus to total demand. During the first quarter of the year, this outlay increased by more than a billion dollars monthly. Expenditure for new plant and equipment continues very large, but there are indications that this is leveling off. On the other hand, construction, stimulated by the easing of material shortages, has reversed the downtrend of 1951 and is approximately back to the level of a year ago.

Cuts in Appropriations

Congress continues its study of the $85.4-billion budgetary program proposed by the President for fiscal 1953. Particular appropriations requests have encountered strong opposition, and large cuts appear likely in the over-all program.

Early in April the House of Representatives passed a $46.2-billion appropriation for the Department of Defense. This was $4.7 billion below the amount requested by the Bureau of the Budget and compares with an estimate of $51 billion which the armed services say they will have to spend next year. President Truman assailed the legislators for the reductions, referring to the action as "fake economy." He has threatened to hold the Congress in special session during the summer unless the funds are restored. There has been no action as yet by the Senate, but Secretary Lovett has appealed to the Senate Appropriations Committee to restore a substantial part of the reduction. Meanwhile, the Senate Foreign Relations Committee has voted a $1-billion cut "across the board" in the Administration's $7.9-billion Mutual Security Authorization bill. It is still too early to know whether these reductions will be retained, but it is clear that strong sentiment for economy exists in Congress. Together these cuts would reduce by more than half the prospective cash deficit for fiscal 1953.

Simplified Customs Bill

Of major importance to foreign traders is the customs simplification bill now before the Senate Finance Committee. The chief aim of this measure, which has already been passed by the House, is clarification of the various standards for evaluating imports. The present system, whose modification has long been urged, has numerous complexities and is considered by many to constitute an invisible tariff.

Under existing regulations, customs officials do not simply bill the im-

(*Turn to page 120, please*)

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More Comfort More Value!

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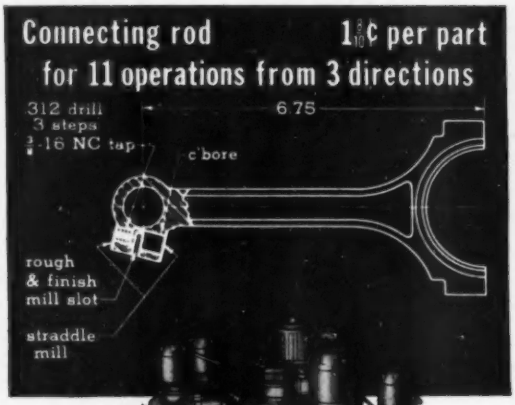
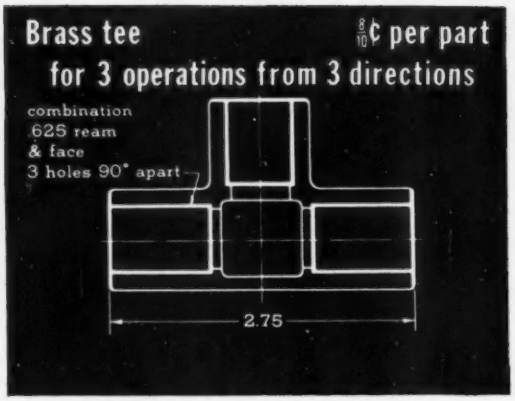
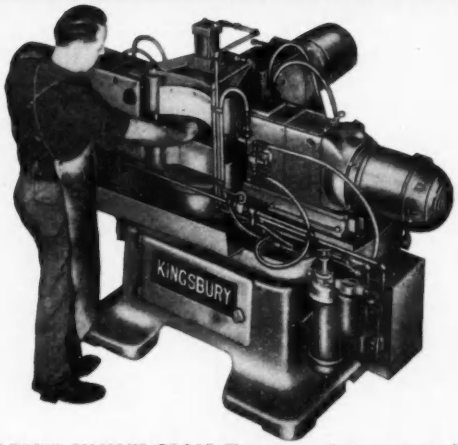




500 PARTS AN HOUR GROSS. Each fixture on this 60-inch "Auto-Index" holds two parts. Horizontal units mill both parts with one cutter. Vertical units on the central column do the holes with two-spindle heads; the counterboring head is inverted.



500 PARTS AN HOUR GROSS. The operator just removes a finished part, replaces it and presses a lever. The machine automatically clamps the work, operates the opposed tools and then the third tool and unclamps the work. There is no indexing.

How much do you pay for

A study of four special drilling and tapping machines that produce at the same rate: 500 parts an hour gross

Dear Sir:

At 80% efficiency each of these Kingsburys averages one finished part every nine seconds. What would that much production cost you?

Each drawing shows the cost for the man and his Kingsbury — no power or overhead. The cost for each man is the same — one 400th part of today's national hourly wage rate. (The 400 is from 3600 secs. in an hour ÷ 9.)

The difference in costs is in the machines, of course. Notice how small this difference is — just one cent between the highest and the lowest, the Connecting Rod and the Brass Tee.

What a difference

Yet the total price of the Rod machine is *seven times* that of the Tee machine. The Rod machine is a massive affair — an 84-inch base with four knees and a central column, nine operating units and a 60-inch power index unit with ten work fixtures that alone weigh 1.2 tons. The Tee machine has just a 68-inch base, three drilling units and one work fixture.

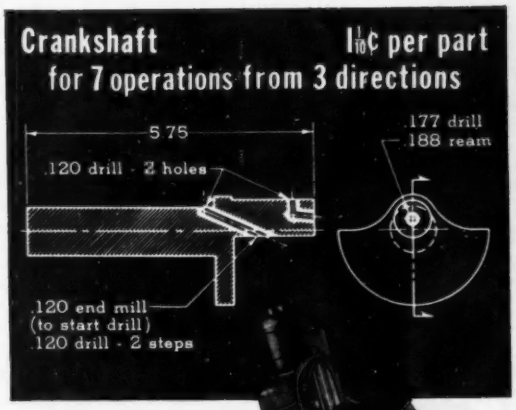
But in unit costs the difference is just one cent, on the basis of amortizing the entire investments in machine and tooling over 6000 hours, a fraction of the useful lives.

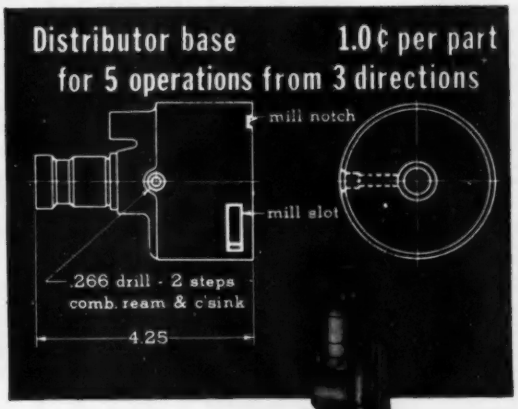
Naturally your figuring might be different. But on a high production basis your costs should be close to ours. With low production — well, that's something else again.

Meets your specifications

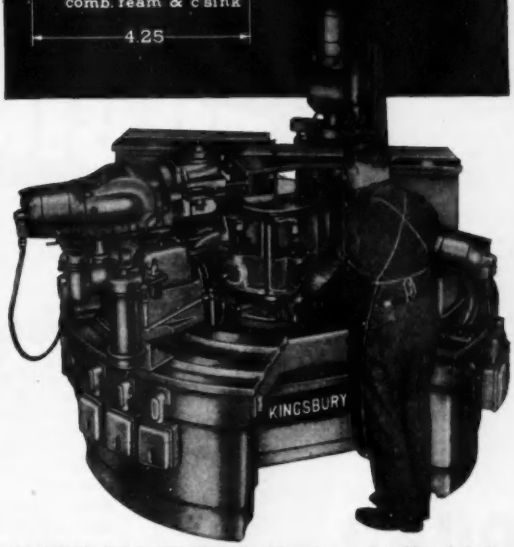
All four of these Kingsburys have the same hourly production rate — 500 parts gross or 400 parts at 80% efficiency. We picked them this way on purpose for this comparison.

Actually we design, build and tool each machine to meet each customer's specifications — the operations he





500 PARTS AN HOUR GROSS. A 20-inch power index table has seven fixtures. Three horizontal units end mill and drill the long .120 hole. The inverted angular unit drills two .120 holes. Two hidden angular units drill and ream the .188 hole.



500 PARTS AN HOUR GROSS. All units on this 20-inch index machine are off the radial lines through the fixtures. Three horizontal units for the hole are 20° left. Another for the slot is 30° right. The vertical unit that mills the notch is 10° right.

9 seconds of production?

names, the production rate he names.

Among other things, each of these customers wanted operations from three directions in one chucking. It was easy for the Brass Tee since each hole needed just one operation. A non-index machine with three automatic drilling units did the trick.

It takes ingenuity

The other three machines had index tables, so it took more ingenuity to work from three directions. The Connecting Rod machine has the usual horizontal and vertical units plus a vertical unit with an inverted auxiliary head that counterbores from below. The units for the Crankshaft are horizontal and at two different angles. For the Distributor Base one unit is vertical and the others are horizontal but at angles to the radial center lines through the work fixtures.

That is, of course, just part of the problem. It takes ingenuity to design a fixture that will hold the work firmly, locate it properly, and still leave room for the tools to operate and the chips to escape. It takes ingenuity to mount all fixtures in exact location on the index table so that all finished parts are fully accurate and uniform. It takes ingenuity on this type of equipment to locate tools to close tolerances.

We feel sure we have the ingenuity to design, build and tool a machine that will meet your requirements.

Sincerely,
Kingsbury Machine Tool Co·p.
97 Laurel Street, Keene, N. H.

KINGSBURY

AUTOMATIC DRILLING & TAPPING MACHINES
for Low-Cost High Production

Business Pulse

(*Continued from page* 116)

porter according to the value of the goods stated on the consular invoice. Rather, they must ascertain the "foreign value" of the merchandise—the price at which it is freely offered for sale in the country of origin—and the "export value"—the price at which it is freely offered to exporters—and then bill the importer according to whichever is higher. The field investigation required by this procedure often entails considerable delay and plagues importers with the possibility that additional duty will have to be paid long after the merchandise has entered the country. The measure now before the Senate committee eliminates "foreign value" as a criterion. Many trade groups who feel that the proposed clarification falls far short of the desired goal are supporting the measure as a good beginning.

MACHINERY INDUSTRIES

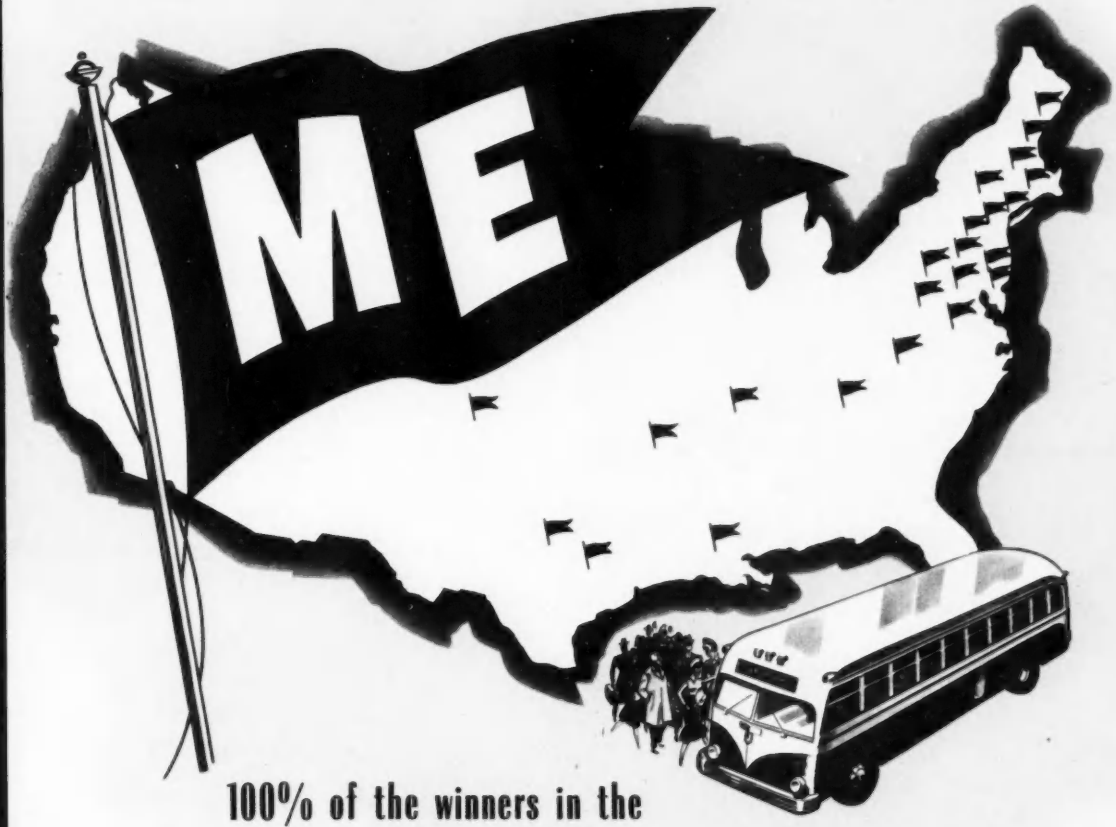
(*Continued from page* 57)

$1000 Offered

Pangborn Corp., Hagerstown, Md., is offering a $1000 U. S. Series E Savings Bond in return for a suitable name for its new airless blast cleaning machine which was recently exhibited at the Foundry Show in Atlantic City. The unit is designed for the batch cleaning of medium sized castings at a high production rate and low cost. One of the contest requirements is that the name selected must be suitable for trademark registration. In the case of duplication, the name bearing the earliest postmark will be selected. Entries must be postmarked not later than midnight, May 24, 1952. Address entries to the Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.

Medal for Pigott

R. J. S. Pigott was the recipient of the Egleston Medal for 1952 at a recent meeting of the Columbia Engineering School Alumni Association. Currently the director of the engineering division of Gulf Research and Development Co., Mr. Pigott was awarded the medal for his outstanding engineering achievements. He developed Gulf's Hi-Jet cooling process for cutting tools.



100% of the winners in the

1951 BUS TRANSPORTATION MAINTENANCE EFFICIENCY CONTEST

use Spicer-equipped vehicles!

The annual Maintenance Efficiency Award is based upon the number of bus service dollars required for miles run . . . hours run . . . and types of traffic on the runs.

Operating conditions represent the widest variety of the most punishing bus service in the United States. Under these circumstances, it is especially significant that *every one* of the 23 winning companies in 1951 used one or more Spicer power transmission products.

Spicer service records are outstanding year after year in *every* field of automotive duty . . . automobile, bus, truck and tractor. They are the result of 48 years of uninterrupted engineering and manufacturing progress, that have made Spicer units the *Standard of the Industry*.

Assures Maintenance Efficiency in any vehicle!

Creative ability, and the talent for putting action into new and progressive power transmission ideas, come naturally to the Spicer engineering staff. They are engineers picked for their inherent ability to comprehend and solve automotive power delivery problems. During the past 48 years, they have worked hand in hand with the manufacturing of every type of automotive vehicle...employing every type of power...and using every power transmission principle. With its eight great and modern production plants...and its skilled personnel in every department...Spicer can serve you more fully, completely, dependably!

48 YEARS OF Spicer SERVICE

SPICER MANUFACTURING • *Division of Dana Corporation*
TOLEDO 1, OHIO

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UNIVERSAL JOINTS
TORQUE CONVERTERS
RAILWAY GENERATOR DRIVES

Government Policies Hit Car Sales in Australia

(*Continued from page* 74)

livery of 196,000 new cars and commercial vehicles—the total in 1939 being 70,000.

The ratio of one car to every 7.8 persons in Australia is second only to that in the U. S., and Australia is equal to this country with one motor truck to every 21 persons.

Before the war Australia needed 70,000 replacement vehicles a year. Today normal replacement is about twice that figure.

Approximately 171,000 motor vehicles were imported in 1950-1951 and their value topped the list of Australian imports.

Dollar restrictions have clamped down on imports of Canadian and American cars, and given British makers a dominating place on the market. More British cars go to Australia than to any other country, second largest buyer being Canada. In 1939 cars of British origin delivered in Australia totaled 23,611. They reached 114,320 in 1950-51, in addition to 28,000 commercial vehicles. British cars today make up 80 per cent of all new cars registered in Australia.

In 1938-39 Australia imported 28,649 cars from Canada and the U. S., most of them as chassis to be assembled with locally made bodies. Only 13,535 were admitted from North America in 1950-51 (12,127 were from Canada) with a mere trickle of assembled cars, and the dollar scarcity has since reduced the flow still more. From the U. S., Australia imported only 1406 cars and 1144 commercial vehicles.

European exporters are securing a growing share of the Australian market. Only 735 cars of European origin came into the country in 1939, but in 1950-51 deliveries totaled 5667. France delivered 3975 (mainly Renaults), Czechoslovakia 938, and Italy 754. As with British cars, shortage of shipping space was the principal factor limiting deliveries.

The automobile industry in Australia provides direct employment for over 200,000 people. Engine production and assembly plants employ about 100,000; body-builders, 14,500; tire and rubber companies, 5000; makers of components and accessories, 45,000; retail establishments, 40,000. Indirectly the industry provided employment for about 15 per cent of the total work force of 2,430,000 in 1949.

Including locally manufactured cars and commercial vehicles, there are 95 different makes on the market. A number of overseas manufacturers who have established assembly plants in Australia have been gradually stepping up the proportion of local components in their models, but this process is being checked by the current steel shortage.

Australian governments have fostered the growth of the local automobile industry with an eye to its defense potential and the impetus it gives to the development of engineering industries. The automobile industry has flourished under a system of special tariff rates which fall most heavily on imported assembled

(*Turn to page* 124, *please*)

Car Sales in Australia

(*Continued from page* 123)

vehicles of all assorted style types.

Concession rates encourage the importation of unassembled cars for assembly at local plants, and the importation of chassis for assembly with locally-built bodies and local components.

Of the 65 assembly plants in Australia, 19 are located in New South Wales and 17 in Victoria—the two most industrialized States in the country.

There are 413 body building plants, with 158 in New South Wales and 139 in Victoria. By far the greatest proportion of bodies, however, are built in the State of South Australia, where there are only 29 plants. Two of the largest automobile groups operating in Australia—General Motors-Holdens, Ltd., and Chrysler, Dodge, De Soto Distributors—build their own bodies in that state. These two groups, and the Ford Motor Co. of Australia, Ltd., which has its headquarters at Geelong, in the State of Victoria, build at least 90 per cent of all the bodies manufactured in Australia. Production of bodies for the 1950-51 period totaled approximately 55,000, not including those built from imported panels.

Of the 124 factories producing component parts and accessories, 52 of them are in Victoria and 44 in New South Wales.

The industry achieved a long-cherished goal when General Motors-Holdens, Ltd., after over a two-year build-up of local plants, began mass production of the Holden car in January, 1949, (AUTOMOTIVE INDUSTRIES, December 1, 1948, and March 1, 1950). This popular six-cyl, 21 hp sedan is the first all-Australian car to be mass produced. Production rate passed 20,000 a year early in 1950. Now one of the most familiar cars on Australian roads, the Holden is so eagerly sought that dealers quote delivery in from three to five years.

Early in 1951 the company went into mass production of an 800 lb capacity utility model powered with the same engine as the Holden sedan.

Production of trucks, cars and tractors from the various Ford plants has trebled since before the war. The company is assembling the American type V-8 Custom sedan locally with an Australian body and mainly Australian components. It is the com-

Every Link the Same...

Here's one reason why every rig equipped with a Fuller ROAD RANGER 10-speed Transmission is posting new records for *higher average speeds:*

Every link is the same, in *equal, progressive,* and *selective* steps—at the driver's command *without gear-splitting.*

Every shift—up or down—is a 28% step. Every ratio is completely usable. Not one of the 10 forward speeds overlaps the next higher or lower ratio.

With these closely spaced ratios—controlled with *one* lever—it is *easy* for the driver to keep the engine operating in *the* maximum economy range . . . to keep the load rolling faster, for less.

Write today for complete information on the Fuller ROAD RANGER, the 10-speed transmission where every link is the same!

Model R-95-C ROAD RANGER®

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Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

Car Sales in Australia

(*Continued from page* 124)

pany's aim to achieve an 85 per cent Australian content in the Custom model. Ford now has started at its Geelong works, large-scale production of its four-cyl Consul, a newcomer to the medium price range.

Soon to join the ranks of locally-assembled cars is a low-priced car of French design (AUTOMOTIVE INDUSTRIES, May 1), which the Hartnett Motor Co., of Melbourne, has in production. It has purchased raw materials, components, jigs, patterns, and dies to build the car to the design of J. A. Gregoire. The car had been designed for a British organization which had planned an inexpensive car but had to abandon the project. It has a six hp two-cyl engine. Production at the rate of 500 a month is the objective.

Another recent major advance in the industry was the launching of a motor truck project by International Harvester Co. of Australia Proprietary Ltd., of Melbourne, last August. The company now is building three to five ton trucks, and is erecting a new plant on the outskirts of Melbourne to turn out a ½ to ¾ ton utility and a one to 1½ ton light truck, as well as the heavy duty vehicles. Initial target is 4000 a year.

According to the nature of their operations, the firms in Australia fall into these groups:

1. Manufacturers of engines and chassis, or major portions of them. The companies are General Motors-Holdens Ltd., which builds engines, chassis, bodies, and components and has its main plants in Victoria and South Australia and assembly plants in all states; the Ford Motor Co of Australia Ltd., manufacturing mainly chassis, engine components and bodies, with main works at Geelong, Victoria, and assembly plants in five states; International Harvester Co. of Australia Proprietary Ltd., manufacturing engines and chassis for utility and medium heavy trucks, and Chrysler Australia Ltd. which is turning out cars that are 70 per cent Australian.

2. Companies engaged solely in assembly of imported "completely knocked down" heavy duty trucks and commercial passenger vehicles in 26 plants throughout Australia, using locally-built bodies.

3. Nuffields (Australia) Proprietary Ltd., and Rootes Ltd., British interests which assemble chassis and bodies from imported components in plants in New South Wales and Victoria, respectively.

4. Australian body building plants of British interests—Austin Motor Co. (Australia) Ltd., and Standard Motor Co. (Australia) Ltd.

5. Assembler-distributors—Australian companies acting as distributors in various states for the two last-named companies, and assembling their vehicles from imported chassis and components, and local bodies. Sixteen other establishments distribute various makes, and operate small assembly plants.

CALENDAR

OF COMING SHOWS AND MEETINGS

American Helicopter Society, Eighth Annual Forum, Hotel Washington, Washington, D. C.....May 15-16

Association of American Battery Manufacturers, Spring Meeting, Roosevelt Hotel, New Orleans, La. .....May 21-23

American Society for Quality Control (sixth annual meeting), Syracuse, N. Y.....May 22-24

Memorial Day 500 Mile Race, Indianapolis, Ind. .....May 30

ASTE Southwest Area Technical Meeting, Dallas, Tex.....May 30-31

SAE Summer Meeting, Atlantic City, N. J.....June 1-6

Third Annual Conference on Industrial Research, Columbia Univ., New York, N. Y.....June 9-13

Triennial Meeting of the International Organization for Standardization, Columbia University, New York, N. Y.....June 9-21

National Truck, Trailer and Equipment Show, Los Angeles, Calif. June 12-15

Industrial Finishing Exposition, Chicago, Ill. .....June 16-20

First International Exhibition of Aircraft Parts and Equipment, Hotel Park Sheraton, New York, N. Y.....June 17-19

American Society of Mechanical Engineers, Applied Mechanics Div., Shock and Vibration Instrumentation Symposium, State College, Pa. .....June 19-21

American Society for Testing Materials (annual meeting), New York City .....June 23-27

SAE West Coast Meeting, San Francisco, Calif. .....Aug. 11-13

Third Annual Elkhart Lake Road Races and Rally, Sports Car Club of America, Elkhart Lake, Wis. .....Sept. 5-7

American Standards Assn., Third National Standardization Conference, Chicago, Ill.....Sept. 8-10

Instrument Society of America (sixth annual meeting), Cleveland, Ohio .....Sept. 8-12

SAE Tractor Meeting, Milwaukee, Wis. .....Sept. 9-11

SAE National Aeronautic Meeting, Los Angeles, Calif.....Oct. 1-4

Paris Automobile Show, Paris, France .....Oct. 2-12

Society of Industrial Packaging and Materials Handling Engineers, 7th Annual Exposition, Chicago, Ill. .....Oct. 14-16

37th International Motor Exposition, London, England .....Oct. 15 22

National Metal Show, Convention Hall, Phila., Pa.....Oct. 20-24

SAE Transportation Meeting, Pittsburgh, Pa. .....Oct. 22-24

1953

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y.....Feb. 25-28

COSTS LESS

WITH Bendix STARTER DRIVE

Clutch pedal starting is safer because the clutch must always be disengaged before starting and disengaging the clutch also minimizes strain on battery and starting motor. Like practically every type of starting system, clutch pedal starting costs less with Bendix* Starter Drive. This unique combination of quality and low cost is made possible by Bendix exclusive design features. For example, the Bendix Starter Drive requires no actuating linkage and the solenoid may be placed in any convenient position. Result—starting motor can be mounted more easily and in more positions. Also the Bendix Drive has fewer parts and needs no adjustments. If you want true economy from installation to service, plus performance proven by over 85,000,000 installations, be sure to specify Bendix Starter Drives. Your inquiry will receive immediate attention.

*REG. U.S. PAT. OFF.

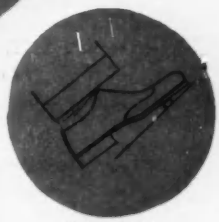
ECLIPSE MACHINE DIVISION of

Bendix AVIATION CORPORATION

ELMIRA, NEW YORK

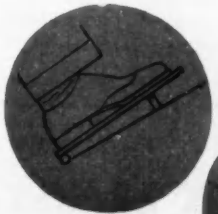
Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

PUSH BUTTON



FLOOR BUTTON

SPECIALISTS IN ALL TYPES OF STARTING!



ACCELERATOR

CLUTCH PEDAL

SWITCH KEY

Cincinnati Shaper reports

simpler, faster, finger-tip control . . .

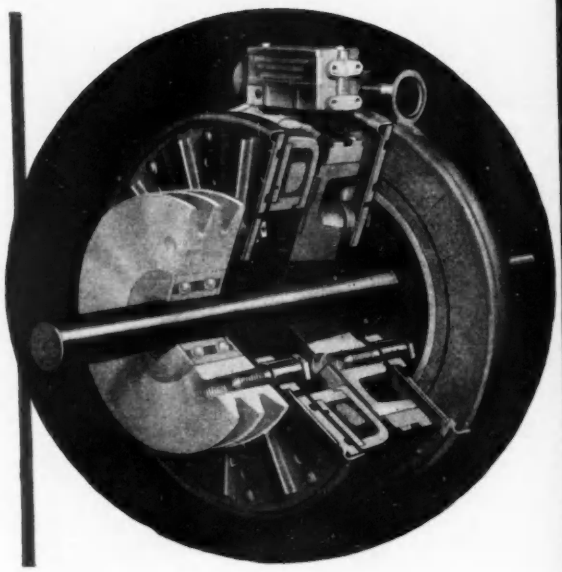
with Warner electric brakes and clutches

electric

motion control

gives these *5* new operating advantages:

- **ram positions more quickly . . . accurately**
- **stops and starts with light touch**
- **no grab . . . powerful, smooth action**
- **control more convenient to operator**
- **no adjustments required**



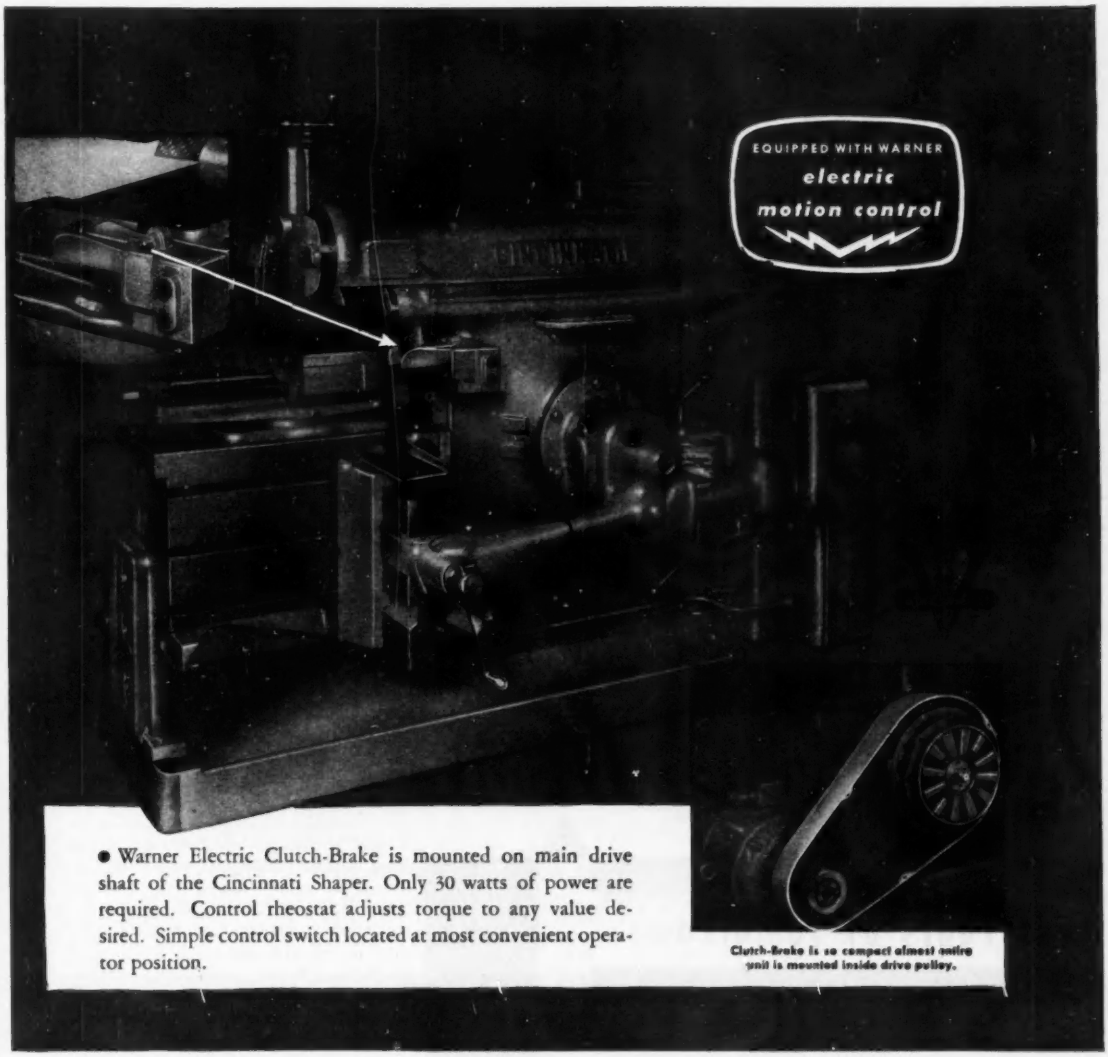
There's no slipping . . . grabbing . . . waiting . . . or reaching for levers when you set up a Cincinnati Shaper for a production run. These versatile machines are standard equipped with Warner *electric motion control.* You're sure to get instant response to operator's signals . . . controlled acceleration and deceleration . . . and convenient, finger-tip actuation of the Warner Electric Clutch-Brake. These are advantages that production men appreciate because they reduce operating costs. Also recognized are the *preventive maintenance* features of Warner units. These powerful clutches and brakes are so simple . . . only two main parts, magnet and armature . . . that no adjustment or maintenance is necessary. Torque remains constant throughout the operating life.

no linkage • lightning fast • push-button control • no adjustments • controlled torque • high heat dissipator • eliminates shock • fine-increment motion • no maintenance • easy to make automatic • more torque per size • low cost

WARNER

ELECTRIC BRAKES & CLUTCHES

FOR INDUSTRIAL APPLICATIONS

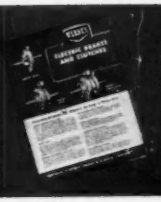


• Warner Electric Clutch-Brake is mounted on main drive shaft of the Cincinnati Shaper. Only 30 watts of power are required. Control rheostat adjusts torque to any value desired. Simple control switch located at most convenient operator position.

Clutch-Brake is so compact almost entire unit is mounted inside drive pulley.

• Warner electric brakes, clutches and clutch-brakes produce more torque for their size and weight . . . are easily designed into original equipment. They may be operated individually or in combination, and are readily adapted to automatic cycling and remote, push-button control. Action is *controlled* and smooth . . . shock is eliminated . . . and torque is easily adjusted to fit the load. Extensively used on spindles, drive shafts and motors of all types of industrial machinery—practically anything that stops and starts.

COMPLETE ENGINEERING SERVICE . . . Warner offers complete application and design engineering service and field assistance. If you have a starting or stopping problem, consult Warner brake and clutch specialists for reliable recommendations on torque loads, mounting, electrical controls, capacity, etc.



Warner Electric Brake & Clutch Co., Dept. AI, Beloit, Wisconsin

☐ Please send your FREE Bulletin No. 703-A.

☐ Have your representative call to discuss my problem.

Firm Name_____

Individual_____ Title_____

Address_____

City_____ State_____

Costs Reduced With Stamped Rocker Arms

(*Continued from page* 51)

drawn bosses of the stamping and is broached to size after insertion.

Besides using stamped rockers, G.M.C. truck engines are equipped with stamped brackets for supporting the rocker shaft. This bracket, shown at F, Fig. 2 and in Fig. 10, includes five stampings, namely, right and left halves, a flat base plate and two formed steel bushings. The bushing holding the shaft is horizontal and the second is really a tube connecting an oil hole through the base with one in the horizontal bushing. This tube is rolled up from a blank, the end of which is so developed that it will fit the horizontal tube where the two join. The horizontal bushing has a hole that registers with a hole in the fixed shaft clamped inside the bushing. Oil is fed through this hole to the hollow shaft through which the oil is fed, in turn, to rocker arms.

Vertical halves of the bracket are fastened together by five projection welds. Later, the base is assembled, after both bushings are in place, by four projection welds. The horizontal bushing is pressed in place. Then metal of the two halves surrounding the bushing is struck by punches having arc shaped ends. This strike spreads the metal and makes it grip the bushing tightly. After assembly, the joints are all hydrogen copper brazed in a continuous furnace.

This bracket is clamped to the head of the engine by two through studs. Of these, the shorter passes through the short vertical tube at one side of the bearing and the longer through the longer tube at the opposite side. When the nut on the latter is tightened, it tends to close the horizontal bushing and lock it around the shaft because this bushing has an open slot opposite a slot cut in the two side stampings and about half way through the longer vertical tube. Above the bushing is a tapped hole for a plug.

Brackets made in this manner are low in cost and rigid, though lighter in weight than cast iron brackets, which require much more machine work. Very little machining is required on the stamped assembly.

As Fig. 10 shows, the height from the base to the center of the horizontal bushing is held between 1.810 and 1.817 in. The hole in this bushing is ball sized to 0.7925-0.7945 in. and is held parallel to the base within 0.002 in. per in. of length. All parts are made from hot rolled steel 0.0897 in. thick except for the inner tube which is of 0.0299-in. stock.

Brackets, shown at G, Fig. 2 and in Fig. 11, for rocker shafts of Caterpillar tractor engines are of quite different design having only one bolt hole through a tubular vertical portion, half of the tube being in each of the two mating stampings that comprise much of the bracket. There are, in addition, top and bottom flanges staked and brazed on and one split horizontal bushing in which the shaft fits and is clamped. Also provided is a hole through extruded bosses for a second shaft parallel to the rocker shaft and a second hole, at the same center height as the

...the most modern power plant available for heavy-duty trucks

Ask for this engine when you buy your new heavy-duty truck. You get 200 hp from a smooth-running, high compression V-8 engine — a sensationally new engine that gives you greater economy and longer life. Just look at these features:

- ★ Modern V-8, high-compression, valve-in-head design!
- ★ 207 horsepower — speed range, 800 to 3200 RPM
- ★ Lowest weight to horsepower ratio in the industry — only 6 lbs. per HP! You carry bigger payloads.
- ★ Most compact engine in its horsepower range—overall length only 43"!
- ★ Faster acceleration — quick response results from short stroke, light flywheel, and 8-cylinder power impulses!
- ★ Good high-speed performance — large bore and short stroke provide ample valve area. Unique combustion chamber shape having ample quench area retards detonation!
- ★ Smoother running engine at all speeds — extra rigidity of short box-like crankcase and five large main bearings reduce vibration!
- ★ Long life—replaceable, wet cylinder sleeves wear well, are inexpensive to replace. Stellite valves and seats and positive-type rotators promote long valve life—chrome-plated top ring adds extra miles between overhaul.

So, for better performance and lower operating costs, be sure your new heavy-duty trucks are powered with a Le Roi H-540. The coupon below will bring you a new H-540 catalog and specification sheet. Send for them today.

Condensed H-540 Specifications

Number of cylinders	8
Bore and stroke, inches	4½ x 4¼
Displacement, cubic inches	540
Horsepower, rated at rpm	207/3000
Weight bare, lbs.	1250

.....Tear out this coupon and mail TODAY!.....

LE ROI COMPANY, Dept. AI-5
1706 S. 68th Street, Milwaukee 14, Wisconsin

Please send me complete information on the "advanced design" features of your new H-540 engine for heavy-duty trucks.

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Company.....

Company Address.....

City..... (.....) State.....

LE ROI COMPANY
MILWAUKEE 14, WISCONSIN
Plants: Milwaukee • Cleveland • Greenwich, Ohio

E-71

Costs Reduced

(*Continued from page* 132)

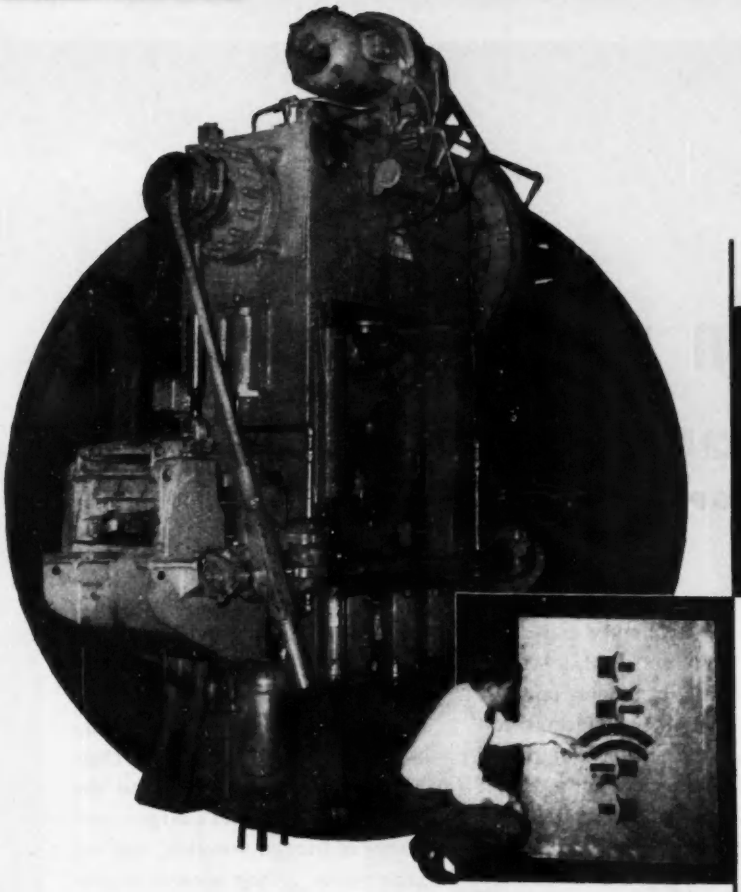
rocker shaft but at right angles thereto, for an oil line.

This assembly is made initially by two projection welds that hold the two halves together. The two flanges then are staked over ears left for this purpose. After the split bushing has been pressed into place, copper is applied where joints are to be made and hydrogen brazing then binds all components into what is, in effect, a one-piece structure which is exceedingly strong and rigid.

Limits on bushing diameter are 0.725-0.727 in. and on hole height above the base 2.781-2.784 in. The base has to be flat within 0.002 in. total indicator reading and square with the vertical hole. Stock used is No. 11 gage except for the base plate, which is No. 6 gage, both being hot rolled steel. Side portions are notched opposite the bushing to afford some clamping action when the fastening nut is tightened, as on the bracket previously described.

Recent developments not yet advanced sufficiently to permit full description have proved that it is possible to produce stamped rockers that are flat rather than bent but that have the bushing boss center line at an angle considerably less than 90 deg to the plane of the rocker. Clearly, widely different designs of stamped rockers are feasible and their utility and ability to compete economically with forged and cast rockers is already well established. Much the same is true also of rocker shaft brackets, although they have yet to attain so many applications as for rockers. Reasonable care in tooling and assembly makes it possible to hold dimensions as close as or closer than for forgings or castings and to do so with much less machine work.

Die cost is not inconsiderable but can be amortized as quickly as for most stampings out of the savings realized in over-all costs. Since stamped rockers are always provided with bronze or babbitt lined bushings, they can be used on shafts that are not hardened and thus save the cost of such hardening, whereas unbushed cast rockers require shaft hardening.



Template shows sizes and shapes of laminations produced in this operation

LOGICAL CHOICE

This Clearing press in the new multi-million dollar "dream plant" of Lincoln Electric Company at Cleveland is producing laminations at 150 strokes per minute, with automatic feed and scrap cutting. Perhaps no manufacturer is better known than Lincoln Electric for its unremitting attention to costs, coupled with a famed incentive system that gives its workers an average yearly wage exceeding $7,000.

Only the most efficient equipment can win a place in such a plant. It's no coincidence that Clearing presses are commonly found in plants that are setting new standards for industry. Clearing presses have been setting new standards on their own—new conceptions of speed, of accuracy, of die life. It will pay you to check with Clearing engineers for a forward-looking answer to your press problems.

CLEARING MACHINE CORPORATION
6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS
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CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

Friction material problem?

R/M BELONGS IN YOUR PICTURE!

"STOP-AND-GO" IS OUR BUSINESS!

Passenger car manufacturers have long brought their brake and clutch problems to RAYBESTOS-MANHATTAN. They *know* they can count on R/M for brake linings, clutch facings, and automotive transmission friction parts for all cars of current or future design.

R/M leadership in the automotive industry is as old as the industry itself. More cars, trucks and buses use R/M friction materials than any other make.

And R/M leadership in these products takes in many other fields, from machine tools to farming equipment.

This wide variety of applications means that R/M experience can help *you* in practically any STOP-AND-GO problem. Call in your R/M representative. He can work from samples, from designs on paper, or from figures on horsepower development combined with desired performance characteristics. Behind him stand the facilities of the world's largest producers of friction materials, with six great plants . . . their research departments, and their testing laboratories.

The opening of our new Wabash Division, Crawfordsville, Ind., provides expanded facilities for the manufacture of
SINTERED METAL FRICTION MATERIALS

R/M
FIRST IN FRICTION

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION 445 Lake Shore Drive, Chicago 11, Ill.
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RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings Fan Belts • Radiator Hose • Industrial Rubber Products • Rubber Covered Equipment • Mechanical Packings • Asbestos Textiles • Sintered Metal Products • Abrasive and Diamond Wheels • Bowling Balls


R/M

Defense Contract Awards

(*Continued from page 52*)

—D—

Dana Corp., Toledo, Ohio
Motor vehicle parts—13920 ea—$236,705
Motor vehicle parts—2800 ea—$175,969
Motor vehicle parts—10080 ea—$148,021

W. S. Darley & Co., Chicago, Ill.
Spare parts—$75,707

Douglas Aircraft Co., Inc., El Segundo Div., El Segundo, Calif.
Sling, aircraft hoisting—104 ea—$34,985
Maintenance parts—75 ea—$35,800

Douglas Aircraft Co., Santa Monica, Calif.
Spare parts—10271 ea—$49,839

—E—

E. A. Laboratories, Brooklyn, N. Y.
Tank & combat vehicle parts—10000 ea—$45,200

Eastern Rotocraft, Willow Grove, Pa.
Bomb sling—1041—$119,508

Eaton Mfg. Co., Spring Div., Detroit, Mich.
Motor vehicle parts—13500 ea—$75,600

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
Generators—$1,269,815
Aircraft instruments—var—$140,725 ea
Transmitters—238 ea—$26,032
Instruments—60 ea—$202,552
Accelerometers—661 ea—$70,315
Indicator—10098 ea—$653,799
Indicator—818 ea—$140,155
Generators—1075 ea—$364,370
Maintenance parts—2125 ea—$33,280
Inverter—69 ea—$38,481
131 items of maintenance parts—556 ea—$63,110
201 items of maintenance parts—500 ea—$80,170
Spare parts—various—$32,920

Eicor, Inc., Chicago, Ill.
Alternator—345 ea—$122,972
Inverters—200—$89,700
Inverters—$707,718

The Electric Auto Lite Co., Toledo, Ohio
Motor vehicle parts—300 ea—$429,249
Motor vehicle parts—64371 ea—$130,173

Electrical Engr. & Mfg. Corp., Los Angeles, Calif.
Actuator—221 ea—$48,365

—F—

Fafnir Bearing Co., New Britain, Conn.
Ball bearings—$56,767

Federal Motor Truck Co., Detroit, Mich.
Motor vehicle parts—6190 ea—$57,934
Motor vehicle parts—1953 ea—$358,607
Motor vehicle parts—536 ea—$27,101
Vehicle parts—1755 ea—$31,151
Vehicle parts—4468 ea—$48,806
Chassis, truck—53 ea—$234,313
Motor vehicle parts—500 ea—$412,500
Motor vehicle parts—4468 ea—$48,806
Motor vehicle parts—2700 ea—$386,807
Motor vehicle parts—6955 ea—$170,272

Firestone Tire & Rubber Co., Akron, Ohio
Tires & tubes—8734 ea—$415,302
Tires & tubes—845 ea—$236,679

Firestone Steel Prod. Co., Detroit, Mich.
Vehicle parts—60000 ea—$1,401,000

Fletcher Aviation Corp., Pasadena, Calif.
Tank, fuel—$7,395,300
Fuel tanks—$54,846
Kits—$78,857

Flex-O-Tube, Meridan Corp., Detroit, Mich.
Vehicle parts—98000 ea—$56,840

Ford Motor Co., Dearborn, Mich.
Metal parts—1035600—$5,289,801

Ford Motor Co., Washington, D. C.
Truck pickup—956 ea—$1,115,662
182 sets

Fruehauf Trailer Co., Detroit, Mich.
Motor vehicles—500 ea—$46,883
Semitrailer—131 ea—$1,086,963
19 sets

(*Turn to page 140, please*)

Moraine has it!

DUREX-100...

The Top-Rated Original Equipment Bearing For Automotive Applications!

Specified as original equipment by many makers of automobiles, trucks and buses—Cadillac, Buick, Oldsmobile, G.M.C., Flxible and others—Durex-100 engine bearings have a snowballing reputation as the desired bearings for original equipment applications.

Here's why...

Durex-100 bearings were specially developed to meet the requirements of today's high-performance engines. Modern-design engines call for a modern-design bearing such as the Durex-100—a different bearing . . . an advance-type bearing . . . with *proved* performance.

Durex-100 bearings are available *now*. For more information on this superior, up-to-date bearing, write us.

THE MATRIX MAKES THE DIFFERENCE

The steel-backed middle layer (or matrix) of the bearing consists of porous copper-nickel. It is firmly bonded mechanically and metallurgically with a babbitt overlay to give the Durex-100 increased embedability and greater resistance to fatigue. The way it is made makes the Durex-100 different in these eight ways:

1. **Greater resistance to fatigue.**
2. **Increased load capacity.**
3. **Greater conformability.**
4. **Better embedability.**
5. **Stronger bond.**
6. **Greater resistance to scoring.**
7. **Greater resistance to corrosion.**
8. **More durability.**

MORAINE PRODUCTS
DIVISION OF GENERAL MOTORS • DAYTON, OHIO

Contract Awards

(*Continued from page* 138)

—G—

Gar Wood Industries, Wayne, Mich.
Motor vehicle parts—16850 ea—$346,054
Motor vehicle parts—7469 ea—$70,150
Motor vehicle—3650 ea—$44,208
Motor vehicle parts 6620 ea—$46,474
Vehicle parts—185 ea—$62,555
Vehicle parts—2271 ea—$82,558
Vehicle parts—220 ea—$156,360
Motor vehicle parts—19359 ea—$177,673
Motor vehicle parts—2349 ea—$96,733
Vehicle parts—3180—ea—$33,017
Motor vehicle parts—1818 ea—$98,500
Tank & vehicle parts—3623 ea—$102,716
Motor vehicle parts—5987 ea—$104,088

Gates Rubber Co., Sales Div., Inc., Detroit, Mich.
Tank & combat vehicle—883000 ea—$247,863

The Gear Grinding Machine Co., Detroit, Mich.
Motor vehicle parts—3000 ea—$104,640

General Electric Co., West Lynn, Mass.
Turbo superchargers—$1,143,806

General Electric Co., Schenectady, N. Y.
Indicators—$59,128
Tachometer—$121,873
Indicator—3485 ea—$133,258

General Electric Co., Phila., Pa.
Maintenance parts—1213 ea—$29,353
Generator—121 ea—$48,966
Indicator, master—229 ea—$238,309

General Motors Corp., Pontiac Motor Div., Pontiac, Mich.
Guns, etc.—21976—$4,760,103

General Tire & Rubber Co., Akron, Ohio
Tires & tubes—560 ea—$236,024
Tires & tubes—3116 ea—$109,044

B. F. Goodrich Co., Akron, Ohio
Connections—$47,730
Maintenance parts—6945 ea—$175,104
Tires & tubes—1315 ea—$40,508
Tires & tubes—1909 ea—$118,159
Deicer boots—over $250,000

The Goodyear Tire & Rubber Co., Inc., Akron, Ohio
Brake & wheel assemblies—$592,711
Tires & tubes—9574 ea—$452,664
Tires & tubes—660 ea—$362,259
Tires & tubes—260 ea—$33,981
Disk brake—1555 ea—$33,361
Aircraft hardware—$98,486

Gould-National Batteries, Inc., Depew, N. Y.
Storage batteries—18000—$952,033
Aircraft storage batteries—$690,425
Battery aeronautic—2931 ea—$115,511

Greenleaf Mfg. Co., St. Louis, Mo.
Indicator—1328—$307,739

Grumman Aircraft Engr. Corp., Bethpage, L. I., N. Y.
Maintenance parts—17 ea—$37,307

—H—

Hammond Mfg. Corp., Pasadena, Calif.
Truck assembly—$90,000

(*Turn to page* 142, *please*)

Cummins® Diesels do so many jobs-so much better

Shovels, cranes, industrial locomotives

Drilling rigs, centrifugal pumps, generator sets

Buses and on-highway trucks

...because they're custom-built to fit the job

Earthmovers, logging yarders and loaders

Off-highway trucks, crawler tractors

Work boats, pleasure craft

Lightweight, high-speed Diesels (50-550 hp) for these and many other uses

---

...because they're

BUILT NOT ONCE BUT TWICE

Rugged, lightweight, high-speed Cummins Diesels are at work everywhere. Each engine is built *twice*. It's assembled, run-in tested, disassembled and inspected, then reassembled and tested again. This extra care in building, plus Cummins exclusive fuel system and an efficient and expanding service and parts organization, means minimum "down time", more power and profits for the user. See your Cummins dealer.

CUMMINS Dynamatic DIESEL

TRADEMARK REG. U. S. PAT. OFF.

Diesel power by CUMMINS

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: Cummins Diesel Export Corporation • Columbus, Indiana, U.S.A. • Cable: Cumdiex

Contract Awards

(*Continued from page* 140)

Hercules Motors Corp., Canton, Ohio
Motor vehicle parts—39916 ea—$373,657
Motor vehicles—17169 ea—$136,600
Engine assy.—400 ea—$926,972

Hewlett-Packard Co., Palo-Alto, Calif.
Generator—47 ea—$33,159

Highway Trailer Co., Edgerton, Wis.
Motor vehicles—7545 ea—$56,902

Hi-Mill Mfg. Co., Milford, Mich.
Hardware—8559 ea—$402,061

Holicer Mfg. & Engr. Comp., Gloster, La.
Motor vehicle parts—195 ea—$25,350

Holley Carburetor Co., Detroit, Mich.
Maintenance parts—various—$530,537
Fuel controls—554 ea—$610,358

Howe Fire Apparatus Co., Anderson, Ind.
Truck—over $250,000

Hughes-Keenan Co., Div. of Hughes-Keenan Corp., Delaware, Ohio
Tractor—32 ea—$287,605

—I—

Industrial Machine Co., Shreveport, La.
Motor vehicle parts—1010 ea—$30,896

International Harvester Co., Detroit, Mich.
Tank and vehicle parts—75—$118,335
Hardware—41200 ea—$93,947

International Harvester Co., Washington, D. C.
Trucks, wrecker—10 ea—$39,499
Truck panel—32 ea—$66,020

International Spare Parts, Long Island City, N. Y.
Motor vehicles—1900 ea—$27,947
Vehicle parts—7915 ea—$54,719

—J—

Jack & Heintz, Inc., Cleveland, Ohio
Inverters—$1,633,002
Inverters—$2,562,910
Maintenance parts—59 ea—$128,041
Generator—1420 ea—$492,664

Keene S. Jackson, Glendale, Calif.
Auto pilot parts—$36,656

—K—

Kelsey-Hayes Wheel Co., Detroit, Mich.
Motor vehicle parts—55000 ea—$473,000

Kenworth Motor Truck Corp., Seattle, Washington
Motor vehicle parts—500 ea—$193,900
Vehicle parts—350 ea—$40,859

Keystone Watch Case Div., Riverside Metal Co., Riverside, N. J.
Indicator—5754—$98,595

Kindred Aviation Corp., Burbank, Calif.
Aircraft parts—$650,755
Crankshafts—50—$35,000

Knorr Maynard, Inc., Detroit, Mich.
Tank & vehicle parts—2950 ea—$73,456

Kollsman Instrument Corp., Elmhurst, N. Y.
Indicator—$57,383
Tachometer indicators—$49,952
Indicators—1775 ea—$200,000

J. P. Kurtz & Co., Alexandria, Va.
Engine parts—$49,389

—L—

Lear, Inc., Grand Rapids, Mich.
Actuator—various—$30,130
Actuator—various—over $250,000

Lee Tire & Rubber Co. of New York, Conshohocken, Pa.
Tires & tubes—3166 ea—$318,246

Leland Electric Co., Dayton, Ohio
Inverters—$339,781

Liquidometer Corp., Long Island City, N. Y.
Indicators—$60,542
Tank units—$131,188

Lockheed Aircraft Corp., Burbank, Calif.
Tip tanks—$105,500
Jet exhaust system—20—$28,547

Lord Mfg. Co., Erie, Pa.
Vibration insulators—$31,563
Mounts—$38,466

(*Turn to page* 144, *please*)

Contract Awards

(*Continued from page* 142)

—M—

McCabe Powers Auto Body Co., St. Louis, Missouri
Motor vehicle parts—1188 ea—$43,382

Mack Mfg. Corp., Plainfield, N. J.
Motor vehicle parts—15575 ea—$46,601

Mackenzie Awning Co., Detroit, Mich.
Motor vehicles—3300 ea—$35,658

Manowatt Dept., General Electric Co., Providence, R. I.
Hardware—5581 ea—$65,967

Mansfield Tire & Rubber Co., Mansfield, Ohio
Tires & tubes—2815 ea—$374,780
Tires & tubes—7000 ea—$657,020
Tires & tubes—750 ea—$36,660

The Glenn L. Martin Co., Baltimore, Md.
Maintenance parts—1050 ea—$85,676
Maintenance parts—4732 ea—$53,057

Mechanic Universal Joint Div., Borg-Warner Corp., Rockford, Ill.
Universal joint assembly—10000—$100,-100

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Indicators—177 ea—$71,363

Mohawk Rubber Co., Akron, Ohio
Tires & tubes—1500 ea—$280,920
Tires & tubes—1940 ea—$68,876

Morris Bros., Auto Trucks & Parts Corp., Maspeth, N. Y.
Hardware—137600 ea—$58,480

Motor Wheel Corp., Lansing, Mich.
Tank & combat vehicle parts—2307 ea —$38,445

Mueller Brass Co., Port Huron, Mich.
Hardware—153370 lbs—$495,150

Mutual Truck Parts Co., Chicago, Ill.
Motor vehicle parts—1494 ea—$34,735

—N—

New Process Gear Corp., Syracuse, N. Y.
Motor vehicle parts—6500 ea—$34,775

The New York Air Brake Co., New York, N. Y.
Hydraulic pump—$28,600
Pump—over $250,000
Pumps—413 ea—$124,088

North American Aviation, Inc., Los Angeles, Calif.
Kits—$232,505

Northwestern Auto Parts Co., Minneapolis, Minn.
Motor vehicle parts—8500 ea—$47,430
Motor vehicle parts—5900 ea—$438,665

—O—

The Oilgear Co., Milwaukee, Wisc.
Tank & combat parts—980 ea—$39,993

(*Turn to page* 148, *please*)

When Auto Radios Present a Tough Problem

"Here's the hitch! We've got to come up with a radio that will fit in this small space. It'll be an odd shape, too."

"Let's talk to Bendix. They've solved more and tougher problems than anybody in the radio business."

TALK TO Bendix MOST TRUSTED NAME IN Radio

When your radio requirements call for unusual shapes or sizes, do what others have done. **Call in Bendix* Radio.** Bendix engineers have solved so many radio and electronic problems that it's virtually impossible to startle them with any request—no matter how impossible it may seem.

And, of course, you can always be certain of getting quality products when you deal with Bendix. Their auto radios have been performance-proven on the cars of one of America's largest manufacturers.

If your problem is price or production, Bendix can be of *real* assistance. They have long been recognized as leading automotive suppliers who understand production line costs and methods.

It boils down to this: if your problem is design . . . or quality . . . or price and production . . . or even if you have no particular problem, it will pay you to talk to Bendix. *REG. U.S. PAT. OFF.

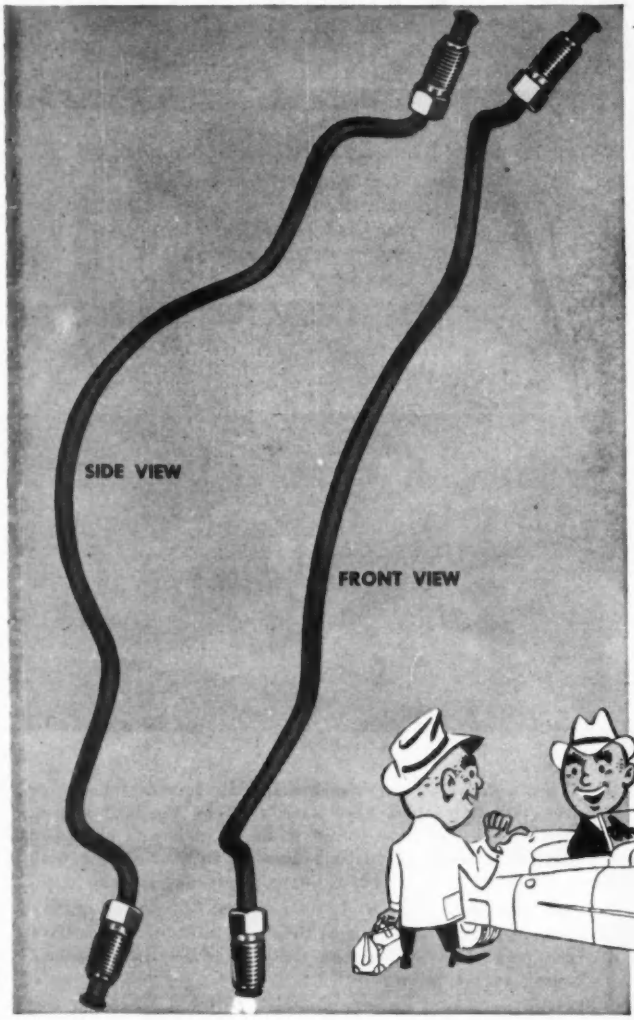
Get the complete story from our Detroit office.

261 McDougall, Detroit 7, Mich. • Phone: LOrain 8-1419 and 8-1313

BENDIX RADIO DIVISION of
BALTIMORE 4, MARYLAND

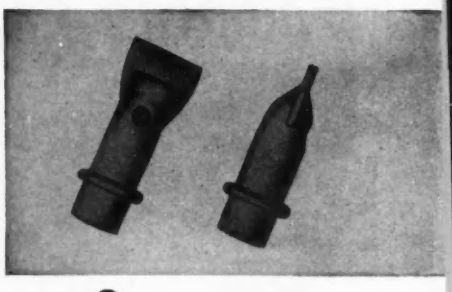
Bendix AVIATION CORPORATION

Get the most from your



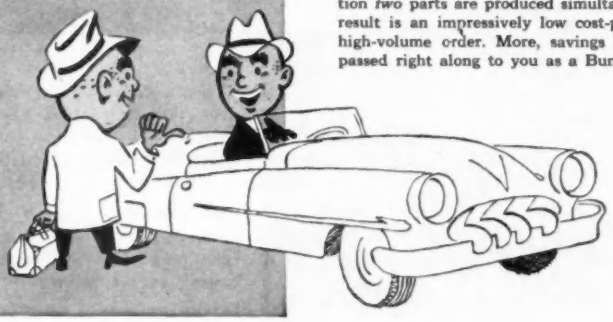
1. FABRICATION SAVINGS

Bundy engineers help pare fabrication costs. An example is the automotive brake tube shown at left. The proximity of the small-radius bends to one another made bending the tube without distortion difficult. Yet Bundy engineers went to work, came up with a *single* fixture to do the complete job without distortion. The result: total fabricating time reduced, costs lowered. These engineering skills are always at *your* disposal when you specify Bundyweld.



2. COST SAVINGS

Though it's less than 1¼" long, the timing-gear oiler tube shown above calls for three fabrication steps: piercing, flattening and upsetting. Bundy engineers were able to combine all steps into a *single* press operation. More, in that single operation *two* parts are produced simultaneously. The result is an impressively low cost-per-unit on a high-volume order. More, savings like this are passed right along to you as a Bundy customer.



WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Copper coating fuses with steel. Presto . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

NOTE the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: *Cambridge, 42, Mass.:* Austin-Hastings Co., Inc., 226 Binney St. • ***Chattanooga 2, Tenn.:*** Pairson-Deakins Co., 823-824 Chattanooga Bank Bldg. • ***Chicago 32, Ill.:*** Lapham-Hickey Co., 3333 W. 47th Place • ***Elizabeth, New Jersey:*** A. B. Murray Co., Inc., Post Office Box 476 • ***Philadelphia 3, Penn.:*** Rutan & Co., 1717 Sansom St. • ***San Francisco 10, Calif.:*** Pacific Metals Co., Ltd., 3100 19th St. • ***Seattle 4, Wash.:*** Eagle Metals Co., 4755 First Ave. South ***Toronto 5, Ontario, Canada:*** Alloy Metal Sales, Ltd., 881 Bay St. • **Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.**

automotive tubing dollar

Safe, dependable performance, unequaled tubing features, and priceless engineering skills — *yours* when you specify Bundyweld Tubing.

You get safe, dependable tubing performance, *proved* by the 360,000 miles of Bundyweld used in cars, trucks, buses and tractors since 1930.

You get leakproof, lighter, stronger tubing that withstands severe shocks and has high fatigue limit. Bundyweld is the only tubing double-walled from a single strip, copper-brazed through 360° of wall contact.

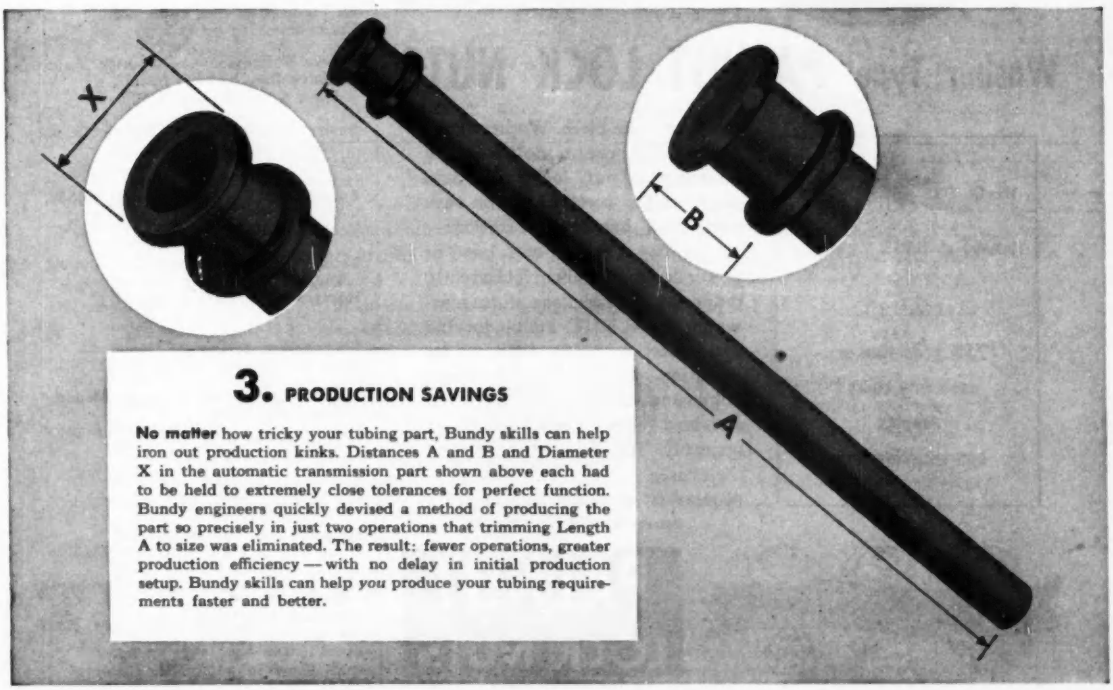
You tap priceless engineering skills. Bundy engineers can often spot major savings in material and production costs during your design and planning stages. And, if you wish, Bundy will fabricate tubing parts for you — deliver them as specified exactly when you want them.

For your greatest automotive tubing buy on *every* count, specify Bundyweld.

Contact a Bundyweld Distributor (listed lower left), or write *Bundy Tubing Company, Detroit 14, Michigan*

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP



3. PRODUCTION SAVINGS

No matter how tricky your tubing part, Bundy skills can help iron out production kinks. Distances A and B and Diameter X in the automatic transmission part shown above each had to be held to extremely close tolerances for perfect function. Bundy engineers quickly devised a method of producing the part so precisely in just two operations that trimming Length A to size was eliminated. The result: fewer operations, greater production efficiency — with no delay in initial production setup. Bundy skills can help *you* produce your tubing requirements faster and better.

Contract Awards

(*Continued from page* 144)

—P—

Pacific Div., Bendix Aviation Corp., North Hollywood, Calif.
Regulator assy.—189—$33,837

Pesco Products Div., Borg-Warner Corp., Bedford, Ohio
Pumps—$85,726
Maintenance parts—849 ea—$63,519

Philco Corp., Phila., Pa.
Spare parts—over $250,000

Pioneer Engineering Works, Minneapolis, Minn.
Spare parts—various—$128,815

Purolator Products, Inc., Rahway, N. J.
Filters—$85,200

—R—

Reo Motors, Inc., Lansing, Mich.
Motor vehicle parts—5600 ea—$40,289

Rep. Steel Corp., Bolt & Nut Div., Cleveland, Ohio
Hardware—4113299 ea—$42,918

Rep. Steel Corp., Union Drawn Div., Massillon, Ohio
Hardware—1767562 lbs—$153,848

Revere Copper & Brass, Inc., Detroit, Mich.
Hardware—283407 lbs—$181,748
3429 ea

Robertshaw Thermostat Div., Robertshaw-Fulton Controls Co., Youngwood, Pa.
Indicators—3625—$1,034,298

The Roflan Co., Everett, Mass.
Maintenance kit—184 ea—$48,653

Rohr Aircraft Corp., Chula Vista, Calif.
Power package—$109,000

Romeo Div., Lear Incorp., Elyria, Ohio
Spares—$65,996

Ross Gear & Tool Co., Lafayette, Ind.
Motor vehicle parts—45 ea—$29,068

Royal Heaters, Inc., Alhambra, Calif.
Tank assy.—$1,495,680

—S—

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y.
Ignition analyzers—$730,321
Magneto assy.—178 ea—$58,256
Magneto assy.—112 ea—$66,700
Maintenance parts—946 ea—$84,290
Maintenance parts—4233 ea—$40,322
Cam—9435 ea—$44,208

Allen Scott Co., Inc., Los Angeles, Calif.
Indicators—4618 ea—$129,073

Seiberling Rubber Co., Akron, Ohio
Tires & tubes—90 ea—$35,275

SKF Industries, Inc., Phila., Pa.
Hardware—1100 ea—$29,711

Sparks Withington Co., Sparton Automotive Div., Jackson, Mich.
Release, bomb rack—$291,705

Sperry Gyroscope Co., Sperry Corp., Great Neck, L. I., N. Y.
Kits—$116,205

Spicer Mfg. Div., Dana Corp., Toledo, Ohio
Vehicle parts—110 ea—$51,897

Standard Steel Spring Co., Detroit, Mich.
Hardware—216720 lbs—$81,270
30 pcs

Stewart-Warner Corp., Chicago, Ill.
Motor vehicle parts—8685 ea—$25,747

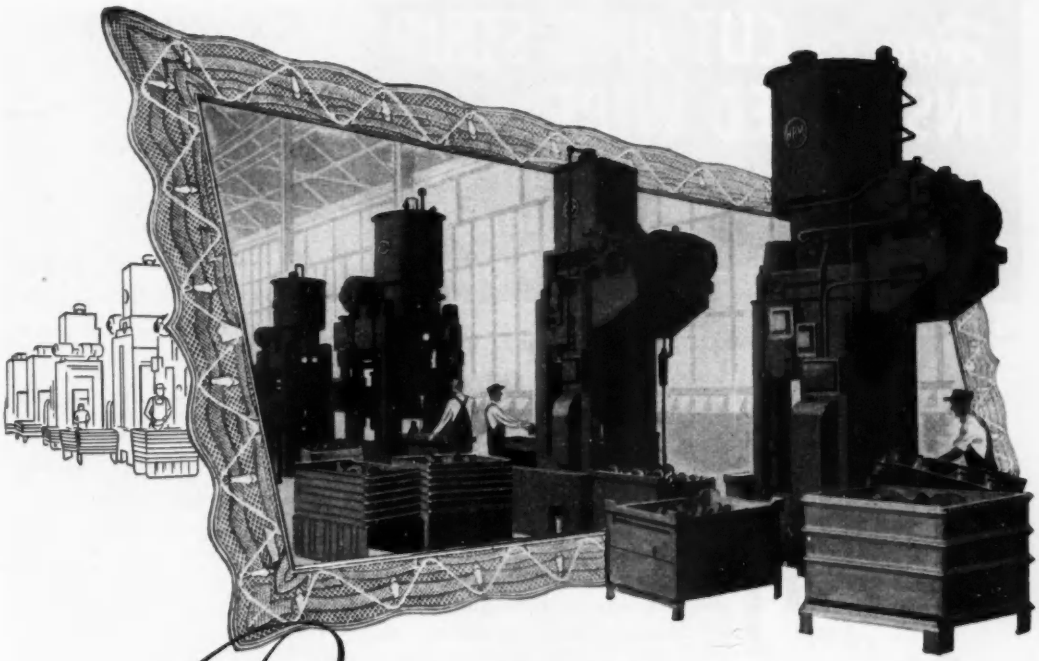
Stolper Steel Products Corp., Menomonee Falls, Wisc.
Tanks & motor vehicles—1300 ea—$66,300

—T—

Thermoid Co., Trenton, N. J.
Motor vehicle parts—38000 pr—$34,205

Thompson Products, Inc., Cleveland, Ohio
Valves—$112,741
Spare parts—$82,479
Spare parts—$57,314

(*Turn to page* 150, *please*)



Responsibility

. . . THE UNWRITTEN GUARANTEE OF H-P-M

H-P-M's unending responsibility is a matter of record — an enviable reputation built by 75 years of service to industry through hydraulics.

The fact that unending responsibility does pay off is reflected in the picture above . . . a 9 press production line in the Albion Malleable Iron Company plant at Albion, Michigan. "Since 1932, when the first H-P-M Press was installed," Collins L. Carter, Albion's President & General Manager reports, "we have standardized on H-P-M hydraulic equipment.

"In our 20 year association with H-P-M, their responsibility has never been known to stop with the manufacture of the press . . . it is right there in our plant today, 'guaranteeing' performance on the production line. Responsibility . . . immediate emergency service . . . plus the fact that these presses have been operating 16 hours a day, with very little downtime is proof enough for me that our confidence in H-P-M and their products has not been misplaced."

Whatever your machine or production problem, you'll profit by the specialized experience and proven responsibility of H-P-M toward its products and its customers. Call us in at the planning stage, won't you?

HPM 75th YEAR

THE HYDRAULIC PRESS MFG. COMPANY

2006 MARION ROAD — MT. GILEAD, OHIO, U. S. A.

Builders of Presses for the Metal Working & Processing Industries • Plastics Molding Presses • Die Casting Machines • Hydraulic Pumps, Valves & Power Units

Contract Awards

(*Continued from page* 148)

Timken Roller Bearing Co., Canton, Ohio
Hardware—124000 ea—$98,391

Titeflex, Inc., Newark, N. J.
Maintenance parts—9360 ea—$34,623
Ignition harness assy.—138 ea—$30,159
Lead assy.—2935 ea—$27,997

Tobe Deutschmann Corp., Norwood, Mass.
Motor vehicle parts—7600 ea—$138,092

Trainor National Spring Co., Newcastle, Indiana
Vehicle parts—18000 ea—$101,700

Trico Machine Products, Brighton, Mich.
Tank & combat vehicle parts—550 ea—$65,522

Triplex Corp. of America, Pueblo, Colorado
Motor vehicle parts—94000 ea—$154,378

Truck & Coach Div., GMC, Pontiac, Mich.
Motor vehicle parts—50869 ea—$25,132
Motor vehicle parts—23100 ea—$32,598
Motor vehicle parts—11700 ea—$277,415
Motor vehicle parts—3000 ea—$68,850
Vehicle parts—92100 ea—$1,254,201
Motor vehicle parts—23908 ea—$39,993
Motor vehicle parts—5176 ea—$39,591

Tyson Bearing Corp., Massillon, Ohio
Hardware—249000 ea—$152,275

—U—

United Aircraft Corp., Hamilton Standard Div., East Hartford, Conn.
Spare parts—1910750 ea—$1,317,600
Spare parts—490 ea—$139,498
Spare parts—170100 ea—$251,335
Spare parts—27177 ea—$28,949
Propeller assys.—25 ea—$252,500

United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford, Conn.
Parts—75 ea—$33,750
Engine tools—2421 ea—$119,134
Spare parts—45908 ea—$33,005
Spare parts—10441 ea—$166,021
Spare parts—538783 ea—$3,764,940
Tools—1972 ea—$36,229
Spare parts—73993 ea—$161,660
Engine spare parts—6621421 ea—$10,-967,818
Spare parts—25085 ea—$39,885

United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford, Conn.
Aircraft engine—132441 ea—$855,647
Spare parts 567988 ea—$998,076
Spare parts—1290191 ea—$1,008,929
Spare parts—3876 ea—$1,229,169
Crankshafts—44 ea—$41,569
Tube assemblies—36360 ea—$145,868
Spare parts—2941 ea—$129,775
Spare parts—31336 ea—$79,544
Pistons—4009 ea—$57,529
Spare parts—211583 ea—$306,160
Spare parts—66530 ea—$712,328
Spare parts—743798 ea—$429,072
Spare parts—28889 ea—$99,783
Maintenance parts—126259 ea—$82,475
Spare parts—3236 ea—$79,879
Training parts—8706 ea—$38,981
Crankshaft assy.—455 ea—$429,866

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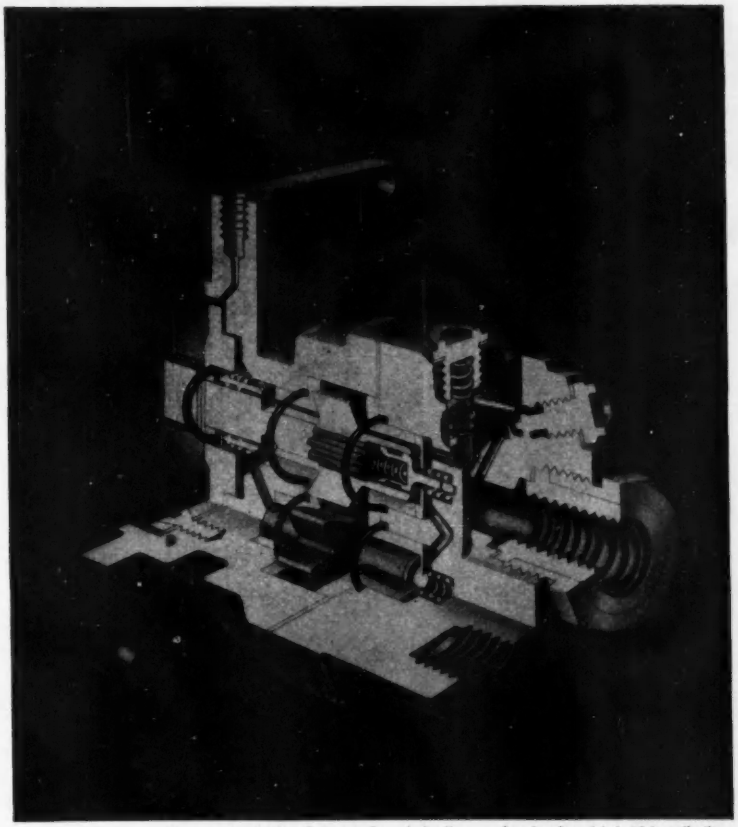

Cutaway view showing O-rings in Pesco hydraulic pump for aircraft and industrial applications.

Simplified Leakproof Seals

WITH PARKER O-RINGS

THIS IS IT

Cross section drawing of O-ring in groove, sealing under pressure.

PARKER synthetic rubber O-rings are simple to use, simple to replace. They require no complicated product design . . . a simple groove is all that is needed. Economical in first cost, they provide perfect, leakproof sealing with economy of weight and space . . . can be used in moving and non-moving applications.

PARKER is the one source for all standard O-rings to meet specifications covering fuel, hydraulic and engine oil services . . . and for special service O-rings of tested and approved compounds. Your Parker O-ring distributor listed at the right will give you Catalog 5100 . . . or write direct to The PARKER Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

Parker

TUBE FITTINGS • VALVES • O-RINGS

Plants in Cleveland • Los Angeles • Eaton, Ohio • Berea, Ky.

Parker

O-RINGS

ARE STOCKED BY THESE AUTHORIZED DISTRIBUTORS

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Irving B. Moore Corp.
65 High Street

BUFFALO, N. Y.
Hercules Gasket & Rubber Co.
327 Washington St. (3)

CHICAGO, Ill.
Air Associates, Inc.
5315 W. 63rd St. (38)
Shields Rubber Co.
564 W. Randolph St. (6)

CLEVELAND, O.
Cleveland Ball Bearing Co.
3865 Carnegie Ave. (3)
Neff-Perkins Co.
1360 West 9th St. (13)

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Air Associates, Inc.
3214 Love Field Dr. (9)
Metal Goods Corp.
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Metal Goods Corp.
2425 Walnut St.

DETROIT, Mich.
J. N. Fauver Co.
49 West Hancock St. (1)

FORT WORTH, Tex.
Adco Industries
3414 Camp Bowie Blvd.

HOUSTON, Tex.
Metal Goods Corp.
711 Milby St. (1)

INDIANAPOLIS, Ind.
F. H. Langsenkamp Co.
229 E. South St.

KANSAS CITY, Mo.
Metal Goods Corp.
1300 Burlington Ave. (16)

LOS ANGELES, Cal.
Aero Bolt & Screw Co., Inc.
1071 Arbor Vitae Ave.
Inglewood, Calif.
Synthetic Rubber Products Co.
1538 South Eastern Ave. (22)

MIAMI, Fla.
Air Associates, Inc.
International Airport

MILWAUKEE, Wis.
Allrubber Products & Supply Co.
612 So. Second St. (4)

MINNEAPOLIS, Minn.
Van Dusen Aircraft Supplies, Inc.
2004 Lyndale Ave., South (5)

NEW ORLEANS, La.
Metal Goods Corp.
432 Julia St. (12)

NEW YORK, N. Y.
Durham Aircraft Service Co.
5615 Northern Blvd., Woodside, N. Y.
Nielsen Hydraulic Equipment, Inc.
298 Lafayette St. (12)

PHILADELPHIA, Pa.
Goodyear Supply Co.
1506 Latimer St.

PITTSBURGH, Pa.
Shields Rubber Co.
137 Water St. (22)

PORTLAND, Ore.
Hydraulic Power Equipment Co.
2316 N. W. Savier St. (10)

ST. LOUIS, Mo.
Metal Goods Corp.
5239 Brown Ave. (15)

TULSA, Okla.
Metal Goods Corp.
302 North Boston (3)

WICHITA, Kans.
Standard Products, Inc.
650 E. Gilbert (11)

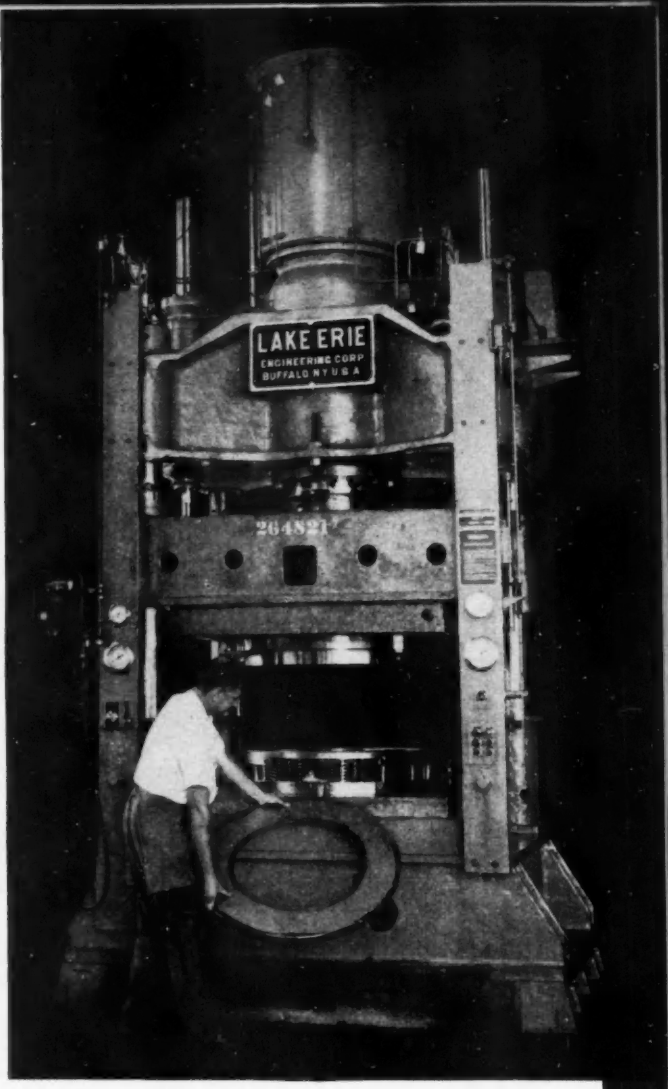
CANADA
Railway & Power Engineering Corp., Ltd.
3745 St. James St.,

GREAT SAVINGS

in manhours and metal consumption made possible by

LAKE ERIE

HYDRAULIC PRESSES

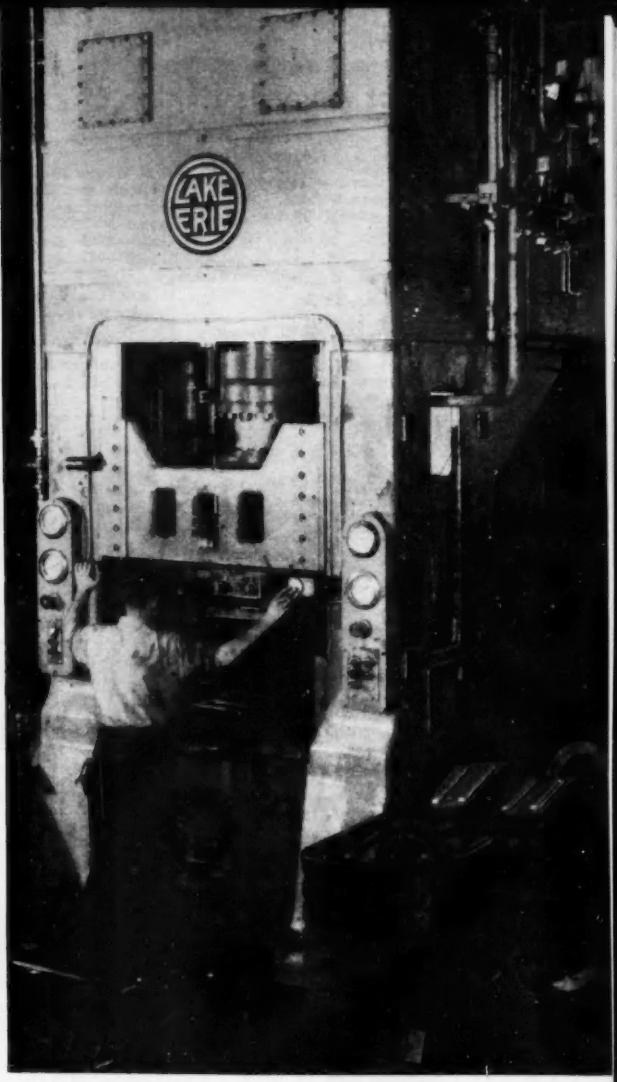


INCREASES VOLUME At Pratt & Whitney Aircraft this 350 ton single action Lake Erie Hydraulic Press with 125 ton cushion draws nickel alloy flame rings for the world's most powerful turbojet aircraft engine. It also enables Pratt & Whitney Aircraft to produce a variety of components more rapidly by simplifying their design, and with improved quality and perfect uniformity by using precision tooling. *This is only one of 9 Lake Erie hydraulic presses delivered to Pratt & Whitney and there are more on order.*

Pratt & Whitney Aircraft, Allis Chalmers and International Harvester are but three of many well-known manufacturers who report great savings in time and materials after installing Lake Erie hydraulic equipment. Lake Erie equipment also enabled these manufacturers to improve product design and reduce assembly operations.

At Lake Erie we are convinced after numerous production method surveys by our experienced engineers, that many manufacturers are producing products today which cost more and take longer to build than is really necessary. Unless you have investigated the production improvements possible through the application of Lake Erie hydraulic press power you may be overlooking the opportunity to materially benefit your company.

Lake Erie hydraulic presses cover such a wide range of capacities and types of applications that they find use in practically all branches of industry...in plants large and small. We welcome your inquiry and will be glad to extend our help toward improving your production methods.



REDUCES UNIT COSTS When tooling for crawler type tractor production at the Allis Chalmers plant a 100 ton Lake Erie Hydraulic Press was selected as the "best piece of equipment to economically produce certain required parts." This press is used to form a number of different parts from sprocket guards to motor supports. *This is only one of more than a score of Lake Erie hydraulic presses chosen by Allis Chalmers.*

SAVES MATERIAL Another leading tractor manufacturer, the International Harvester Company, found that after they installed a 200 ton Lake Erie Hydraulic Press they effected an important saving in metals because of less scrapped parts. A second economy came in longer die life because of precision press construction and pressure control. Approximately 30 different tractor parts are produced on the press. *This is only one of a dozen Lake Erie hydraulic presses delivered to International Harvester and there are many more on order.*

LAKE ERIE ENGINEERING CORP.

MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY

General Offices and Plant:

509 Woodward Avenue, Buffalo 17, New York

LAKE ERIE HYDRAULIC PRESSES are available in any size . . . standard, modified and special designs—horizontal and vertical types—for Metal Working—Plastics Molding—Forging—Metal Extrusion—Processing—Vulcanizing—Laminating—Stereotype Molding—Die Casting—Briquetting—Baling—Special Purpose.

LAKE ERIE ®

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

"Producing the very finest hydraulic machinery possible to help manufacturers produce more efficiently."

Contract Awards

(*Continued from page* 150)

United Aircraft Corp., Sikorsky Aircraft Div., Bridgeport, Conn.
Retrofit kits—72 ea—$232,495
Spares—$150,000

United Aircraft Products, Inc., Dayton, Ohio
Cooler assy.—202 ea—$29,367

United Motors Serv. Div., GMC, Detroit, Mich.
Motor vehicle parts—93818 ea—$123,016
Tanks & vehicle parts—8900 ea—$59,065
Motor vehicle parts—37300 ea—$158,523
Tank & vehicle parts—18090 ea—$36,770
Motor vehicle parts—8500 ea—$41,990
Motor vehicle parts—25150 ea—$122,422

U. S. Gauge Div., American Machine & Metals, Inc., Sellersville, Pa.
Oil transmitter—12810—$531,215
Indicator—2929—$72,215
Gage—9212—$92,471
Gauge—4430 ea—$39,471

U. S. Rubber Co., Detroit, Mich.
Tires & tubes—975 ea—$270,045
Tires & tubes—17477 ea—$156,264

U. S. Rubber Co., Phila., Pa.
Hose—42584 ft—$30,788

Universal Prod. Co., Inc., Dearborn, Mich.
Motor vehicle parts—2000 ea—$56,140
Motor vehicle parts—1100 ea—$120,291

—V—

Vapor Heating Corp., Chicago, Ill.
Control box—150 ea—$26,152

—W—

Ward LaFrance Truck Corp., Elmira, N. Y.
Vehicle parts—1000 ea—$487,509
Vehicle parts—4090 ea—$26,358
Motor vehicle parts—5965 ea—$77,832
Motor vehicle parts—420 ea—$146,283
Motor vehicle parts—300 ea—$119,190

Western Gear Works, Lynwood, Calif.
Actuator—46 ea—$35,282

Westinghouse Electric Corp., Dayton, Ohio
Generators—$1,413,288
Aircraft hardware—$112,600
Generators—654 ea—$275,785

Westinghouse Electric Corp., Aviation Gas Turbine Div., Phila., Pa.
Maintenance parts—3646 ea—$441,809
Maintenance parts—4573 ea—$169,826
Maintenance parts—68061 ea—$411,750
Jet engine tools—2555 ea—$123,321
Maintenance parts—27351 ea—$1,691,716
Maintenance parts—31842 ea—$236,716
Maintenance parts—169 ea—$126,750
Maintenance parts—35055 ea—$119,515
Engine maintenance parts—781589 ea—$2,517,696
Maintenance parts—13141 ea—$955,948
Vane assys.—152 ea—$45,628
Actuator—32 ea—$47,408

Weston Hydraulics Ltd., North Hollywood, Calif.
Valves—107 ea—$41,011
Valve assys.—153 ea—$85,244

Willard Storage Battery Co., Cleveland, Ohio
Vent caps—153539 ea—$78,651

Willys-Overland Mfrs., Inc., Toledo, Ohio
Motor vehicle parts—4100 ea—$33,234
Motor vehicles—16300 ea—$51,592
Motor vehicle parts—10000 ea—$50,400

Wincharger Corp., Sioux City, Iowa
Dynomotor—4850 ea—$251,385

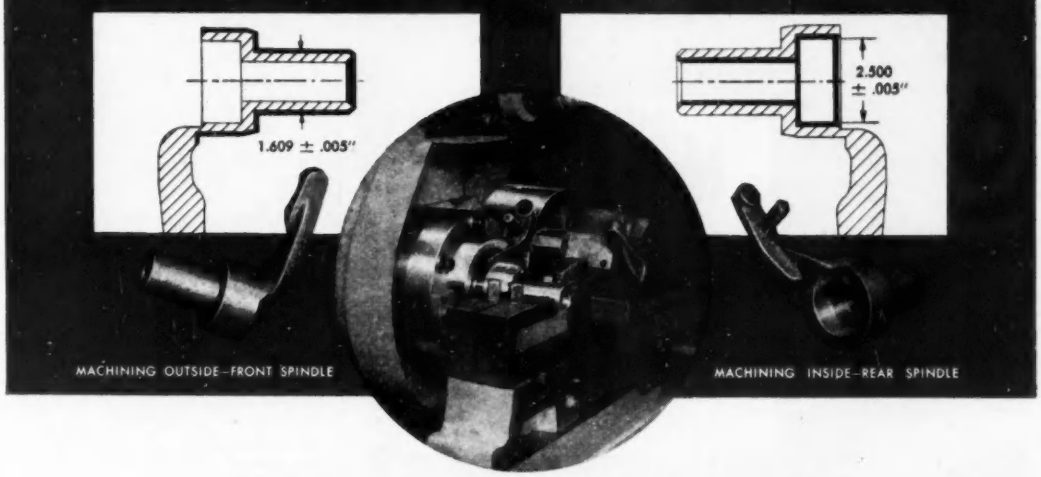
—Y—

Yale & Towne Mfg. Co., Stamford, Conn.
Maintenance parts—$45,177

K-F Loss in 1951 at $12.3 Million

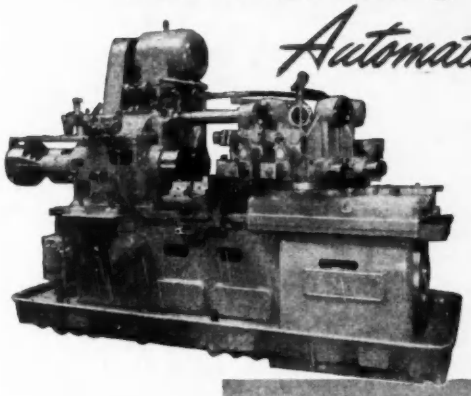
Kaiser-Frazer Corp. reduced its loss in 1951 but still had a deficit of more than $12.3 million, according to the company's annual report. Sales last year dropped to $145,652,685 from $238,035,683 the previous year, and the number of cars produced declined from 151,415, in 1950 to 99,536. Working capital also showed a slight drop to $13.8 million from $14.1 million the previous year.

THIS FORGING IS *COMPLETELY* PRECISION-MACHINED IN *ONE* AUTOMATIC TURRET CYCLE



2 SPINDLES--ONE POWER SOURCE
PROVIDE INCREASED PRODUCTION AT LOWER COSTS

THE POTTER & JOHNSTON 5D-2
Automatic Turret Lathe



Designed to meet today's requirements for increased production of precision-machined work, the Potter & Johnston 5D-2-9" machine is equipped with a double spindle headstock and provides two tool stations on each turret face. It is now possible to perform an operation on two parts simultaneously, or an operation can be performed on one part while supplementary work is, at the same time, being done on a second. Output is far greater than the best obtainable from one single spindle unit. Initial cost, power consumption, floor space and operator attention are all much less than that required for two single spindle machines; production costs are lowered substantially.

Complete information about the 5D Automatic Turret Lathe including dimensions, specifications and design data will be sent on request. If desired, P&J tooling recommendations and time estimates based on your own sample parts or prints will gladly be furnished.

POTTER & JOHNSTON
COMPANY
PAWTUCKET, RHODE ISLAND

SUBSIDIARY OF PRATT & WHITNEY — P&J — DIVISION NILES • BEMENT • POND CO.

Defense Facilities

(*Continued from page 53*)

—H—

D. H. Hadley, Pomona, Calif.
Aircraft parts—$9,672 (80)

The Hamlin Metal Products Co., Akron, Ohio.
Aircraft and ordnance parts—$110,800 (70)
Aircraft and ordnance parts—$471,000 (25)

Harnischfeger Corp., Crystal Lake, Ill.
Diesel engines—$725,000 (25)
Diesel engines—$165,339 (50)

The Hartman Electrical Mfg. Co., Mansfield, Ohio.
Aircraft parts—$113,000 (65)

The Heritage Co., Huntington, L. I., N. Y.
Aircraft parts—$37,300 (65)

Holley Carburetor Co., Van Dyke, Mich.
Aircraft parts—$339,700 (65)

Hollywood Tool & Engineering Co., North Hollywood, Calif.
Aircraft parts—$13,036 (80)

The Hoskins Mfg. Co., Detroit, Mich.
Aircraft parts—$197,857 (65)

Wm. J. Hunt Mfg. Co., Baltimore, Md.
Aircraft parts—$9,278 (80)

—I—

Inland Steel Products Co., Milwaukee, Wis.
Aircraft products—$130,224 (50)

—J—

Jarecki Machine & Tool Co., Grand Rapids, Mich.
Aircraft parts—$153,400 (65)

—K—

Kenlock Mfg. Co., Lynbrook, N. Y.
Aircraft components—$11,450 (80)

Kenworth Motor Truck Corp., Seattle, Wash.
Ordnance vehicles—$100,000 (65)

—L—

Ladish Co., Cudahy, Wisc.
Aircraft parts—$5,937,300 (65)

Lakeside Aluminum Co., Minneapolis, Minn.
Aircraft parts—$79,431 (70)

The Lamson & Sessions Co., Birmingham, Ala.
Aircraft parts—$109,000 (50)

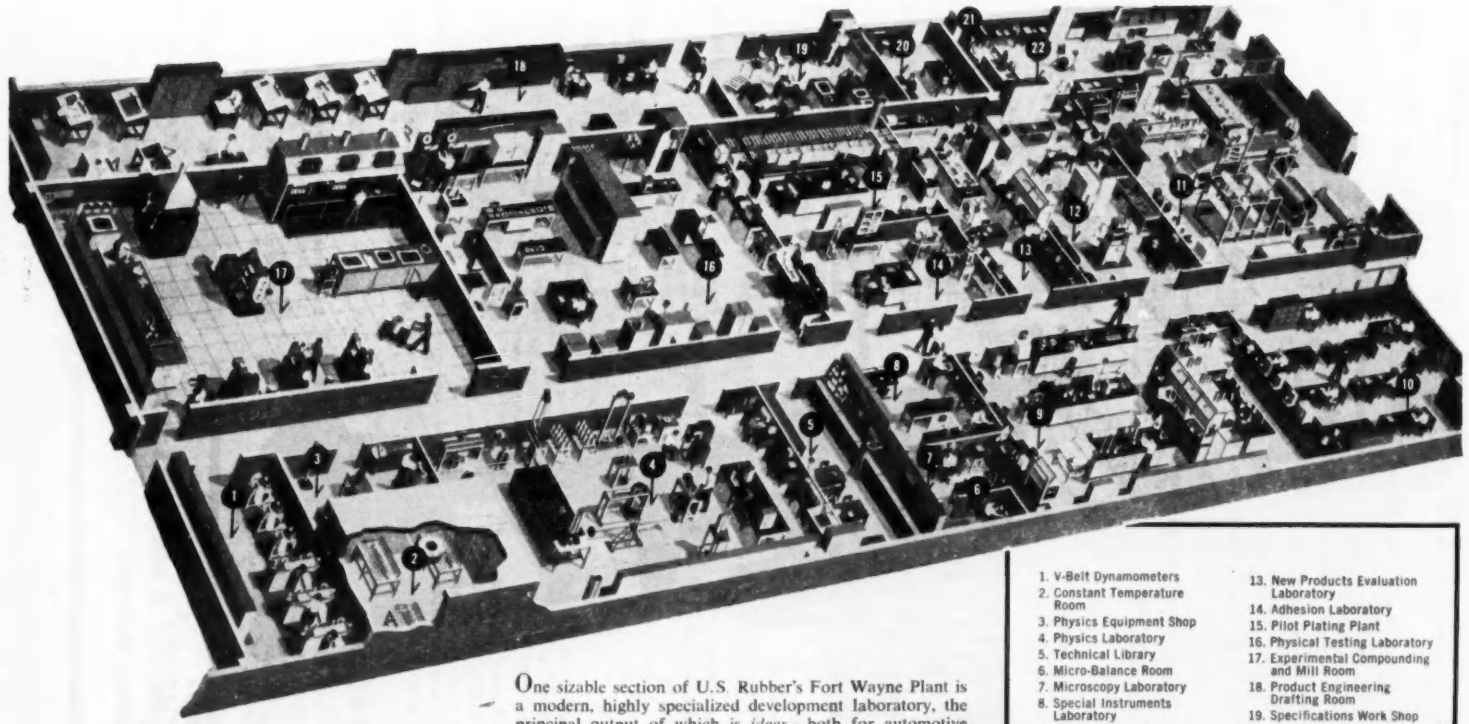
The Lamson & Sessions Co., Cleveland, Ohio.
Aircraft parts—$55,625 (50)

The Lamson & Sessions Co., Kent, Ohio.
Aircraft parts—$64,875 (50)

The Lennox Furnace Co., Fort Worth, Tex.
Aircraft parts—$18,000 (65)

J. Leukart Machine Co., Inc., Columbus, Ohio.
Aircraft parts—$163,236 (70)

(*Turn to page 158, please*)



1. V-Belt Dynamometers
2. Constant Temperature Room
3. Physics Equipment Shop
4. Physics Laboratory
5. Technical Library
6. Micro-Balance Room
7. Microscopy Laboratory
8. Special Instruments Laboratory
9. Chemical Laboratory
10. Technical Office
11. New Products Laboratory
12. New Products Pilot Plant
13. New Products Evaluation Laboratory
14. Adhesion Laboratory
15. Pilot Plating Plant
16. Physical Testing Laboratory
17. Experimental Compounding and Mill Room
18. Product Engineering Drafting Room
19. Specifications Work Shop
20. Product Engineering Office
21. Dark Room
22. Metallographic Laboratory

Idea Factory for the Automotive Industry

One sizable section of U.S. Rubber's Fort Wayne Plant is a modern, highly specialized development laboratory, the principal output of which is *ideas* – both for automotive manufacturers and the military.

Here, carefully chosen technicians apply their skills and experience to the creation and perfecting of rubber-bonded-to-metal, all-rubber, and plastic parts. Working closely with customers' engineering staffs, they are producing many new and often revolutionary designs to meet changing needs.

You will be interested in a booklet, "This is Your Laboratory," explaining the unique service this U.S. Rubber unit is performing. Address: Engineered Rubber and Plastic Parts, Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20, N. Y.

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SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Defense Facilities

(*Continued from page 156*)

Lumoor Mfg. Co., New Haven, Conn.
Aircraft parts—$11,777 (65)

Lundy Mfg. Corp., Long Island City, N. Y.
Aircraft parts—$12,293 (80)

— Mc —

McLean Development Lab., Inc., Dallas, Texas.
Aircraft research—$7,289 (75)
Aircraft armament—$10,888 (75)

McMillen Grinding Co., Cleveland, O.
Aircraft parts—$17,502 (80)

— M —

Majestic Machine & Tool Co., Dearborn, Mich.
Aircraft engine parts—$33,518 (65)

Mars Engineering & Mfg. Co., Burbank, Calif.
Aircraft parts—$135,880 (80)

Mar Vista Engineering Co., Los Angeles, Calif.
Aircraft parts—$83,260 (70)

Meletron Corp., Los Angeles, Calif.
Aircraft parts—$27,099 (75)

Metalco, Inc., Sheboygan, Mich.
Aircraft parts—$5,713 (65)

Monadnock Mills, San Leandro, Calif.
Aircraft parts—$42,465 (70)

Monument Engineering Co., Inc., Indianapolis, Ind.
Aircraft parts—$8,922 (75)

— N —

National Gear Corp., Indianapolis, Ind.
Gears for aircraft—$19,125 (80)

National Water Lift Co., Kalamazoo, Mich.
Aircraft parts—$13,580 (70)

Northrop Aircraft, Inc., Hawthorne, Calif.
Aircraft—$57,741 (65)
Airplanes—$52,443 (65)
Aircraft parts—$76,020 (65)

— O —

Oracle Engineering & Sales Corp., Tucson, Ariz.
Aircraft parts—$29,856 (80)

Orenduff & Kappel, Inc., Mineola, L. I., N. Y.
Aircraft parts—$32,853 (70)

Oshkosh Motor Truck, Inc., Oshkosh, Wisc.
Truck—$111,547 (65)

— P —

Pachmayr Gun Works, Los Angeles, Calif.
Aircraft parts—$225,000 (45)
Aircraft parts—$140,900 (70)

Pacific Airmotive Corp., Burbank, Calif.
Aircraft parts—$46,400 (65)

Pacific Tube Co., Los Angeles, Calif.
Aircraft tubing—$3,092,600 (50)

Pako Corp., Minneapolis, Minn.
Aircraft parts—$16,771 (75)

W. "Pat Crow", Inc., Fort Worth, Tex.
Aircraft parts—$95,795 (65)

Precision Piece Parts, Inc., Mishawaka, Ind.
Aircraft parts—$28,530 (80)

— R —

Radioplane Co., Van Nuys, Calif.
Aircraft parts—$9,104 (75)

Rade Mfg. Co., Fenton, Mich.
Aluminum castings for aircraft—$23,333 (65)

Raybestos-Manhattan, Inc., Passaic, N. J.
Wire braided hose for aircraft—$40,000 (65)

Rockwell Register Corp., Bellefontaine, Ohio.
Aircraft parts—$555,000 (65)

Rocky Mountain Steel Products, Inc., Los Angeles, Calif.
Aircraft assemblies—$5,504 (75)

(*Turn to page 160, please*)

SUN TEST STANDS FOR USE IN ASSEMBLY BRANCHES OF LARGE CAR MANUFACTURER

car, truck and tractor factories

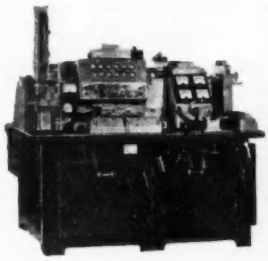
engine builders

component parts manufacturers

eliminate headaches
save thousands of dollars
by
TEST BEFORE DELIVERY

SUN
makes it easier
for you

...with special-order, built-to-specification scientific test equipment



Stations are provided for several men to work simultaneously in testing:

- Generator Regulator
- Ignition Coil
- Fuel Level Indicator
- Oil Pressure Indicator
- Temperature Indicator
- Charge Indicator
- Oil Pressure Sender
- Distributor Tests
- Fuel Gauge Tank Unit
- Generator
- Starting Motor Assembly
- Heat Indicator Bulbs
- Thermostat Temperatures
- Armatures
- Thermostat Leakage

In car, truck and tractor factories and assembly plants; in engine plants and in the factories of component parts manufacturers, SUN Equipment is being used in production testing, spot checking and in Material Return rooms.

The testing of electrical and other engine accessories, under service conditions, to determine compliance with factory specifications, is a high-speed, simplified operation on SUN Electrical Test Stands. SUN Test Stands are saving innumerable dollars for manufacturers. In many vehicle factories and assembly branches, electrical and other engine parts and systems are being tested on SUN Equipment *before* they are installed on new vehicles.

In Material Return rooms SUN Test Stands are separating the good from the bad.

Among Engine Builders, SUN Test Stands are popular for determining engine performance on equipment identical to that used at the car factory.

Component Parts Manufacturers are finding it advantageous to use the same kind of SUN Equipment the vehicle factory uses.

Tell us your problems and we will be glad to discuss the design of special test equipment for your particular need.

ELECTRIC CORPORATION
6373 AVONDALE AVENUE
CHICAGO 31, ILLINOIS

R5951

Defense Facilities

(Continued from page 158)

—S—

Schroeder Tool & Mfg. Co., North Hollywood, Calif.
Aircraft parts—$23,409 (75)

Schweizer Aircraft Corp., Big Flats, N. Y.
Helicopter assemblies—$86,848 (65)

Solar Aircraft Co., Des Moines, Iowa.
Aircraft parts—$127,039 (65)

Shenango Tube Co., Wheatland, Pa.
Steel tubing for aircraft—$4,029,500 (50)

A. O. Smith Corp., Milwaukee, Wisc.
Parts—$150,000 (50)

S. Morgan Smith Co., York, Pa.
Hydraulic turbines—$2,600,000 (65)

W. M. Steel Co., Inc., Worcester, Mass.
Aircraft parts—$10,119 (80)

Sunbeam Corp., Chicago, Ill.
Aircraft parts—$114,610 (65)

—T—

Thermoid Co., Huntington, Ind.
Wire braided hose for aircraft—$1,132,400 (40)

The Timken-Detroit Axle Co., New Castle, Pa.
Parts—$25,095 (65)

Towle & Son Co., Phila., Pa.
Aircraft parts—$26,561 (80)

—U—

United Aircraft Corp., East Hartford, Conn.
Aircraft engine & parts—$2,573,984 (65)

U. S. Rubber Co., Chicopee Falls, Mass.
Military tires—$248,402 (50)

U. S. Rubber Co., Detroit, Mich.
Military tires—$184,530 (50)

United States Rubber Co., Passaic, N. J.
Wire braided hose for aircraft—$193,194 (65)
Wire braided hose for aircraft—$1,326,436 (25)
Wire braided hose for aircraft—$30,004 (65)

—V—

Valor Tool & Machine Co., Dearborn, Mich.
Aircraft parts—$54,125 (80)

Vinco Corp., Detroit, Mich.
Aircraft parts—$14,810 (65)

—W—

Wells Aircraft Parts Co., Los Angeles, Calif.
Aircraft parts—$3,050 (80)

Wyman-Gordon Co., Worcester, Mass.
Aircraft parts—$1,191,625 (65)

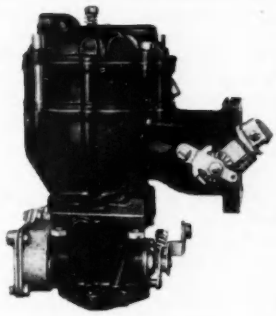
—Z—

Zahner Mfg. & Machine Co., Compton, Calif.
Aircraft parts—$54,627 (65)

Does Your Truck Have Sales Appeal?

IT ALL DEPENDS
ON PERFORMANCE
and
PERFORMANCE
DEPENDS ON

Zenith
CARBURETORS



In the practical field of commercial transportation, product preference is determined solely on performance. Nothing contributes more to the achievement of this desirable end than efficient carburetion. You can be sure that manufacturers whose vehicles are equipped with Zenith, the leader in the field of heavy duty carburetion, have measured carburetion costs in lasting terms rather than initial expense. Zenith's rugged construction, strong idling, freedom from stalling and response to every power demand gives any commercial vehicle added sales appeal. It pays to specify Zenith — the engineers' choice for trouble-free operation.

ZENITH CARBURETOR DIVISION OF
696 Hart Avenue · Detroit 14, Michigan

Bendix
AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

American Cars Dominate Italy's Automobile Show

(*Continued from page 37*)

580 chassis. A V-eight Diesel with an output of 130 hp is used, and the transmission now is separate from the engine. It has eight speeds forward and two in reverse, and is of the pneumatically operated, preselective type.

To meet the American demand for sports cars, Siata has produced a special tubular frame chassis with a Chrysler V-eight engine and a De Dion type rear axle. A 45½ cu in. sports runabout with tubular frame, a wheelbase of 83 in., and a claimed speed of 87 mph, was another new Siata presentation.

Cisitalia, after being in difficulties, has resumed production with the 202 D competition model, which has a four-cylinder B.P.M. engine of 170 cu in., the speed of which is said to be in excess of 135 mph.

F.A.M., exhibiting for the first time, had a car powered by a 30 cu in. twin-cylinder engine. Its four-passenger body is built of strip steel united by bands of rubber and synthetic material.

Although not a commercial proposition, the record-breaking Bisiluro designed by engineer Piero Taruffi, was on exhibition. This is composed of two separate fuselages mounted side by side, one carrying the driver and the other the 122 cu in. Maserati engine.

Nash-Healey showed a car with the Healey frame, a Nash engine and a body by Pinin Farina, also the Nash 1952 Jubilee model imported direct. Willys-Overland showed the Aero-Ace and the Aero-Wing models for the first time in Italy.

Germany's comeback was strong both in the passenger car and truck sections, the former comprising the Ford Taunus; the Goliath GP 700 with a two-cylinder, two-stroke engine; the Borgward Hansa 1500; and Mercedes gasoline and Diesel engine cars.

Bendix Outfits a Bomber for Landing Gear Tests

A North American B-25 bomber with the armament removed was recently purchased and refitted with laboratory equipment by the Bendix Products Div. of Bendix Aviation Corp. The plane will be used to field-test wheels, brakes, shock struts, steering units, and many new devices which are being designed for improved ground handling and landing of airplanes.

Copper Scrap Recovery Down Slightly in 1951

According to a recent statement by the Bureau of Mines, total recovery of copper from scrap during 1951 is estimated at 971,000 tons, contrasted to 977,000 in 1950. While recovery by secondary smelters, brass mills, and primary producers showed declines from 1950, foundries upped their recovery considerably to bring the 1951 total close to the previous year's level.

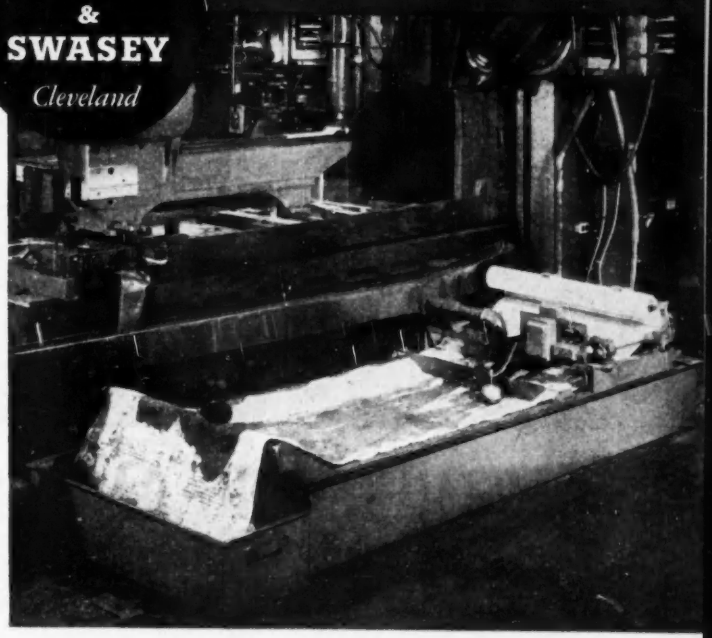
CASE HISTORY

Delpark

INDUSTRIAL FILTERS

SAVE TIME ★ SAVE MONEY ★ SAVE EQUIPMENT

WARNER & SWASEY
Cleveland



• THIS STORY, typical of numerous Delpark case histories, comes from the Warner & Swasey Company, the world's largest manufacturer of turret lathes.

Work scratches on machine ways, caused by grinding wheel particles returning to the work in unfiltered coolant, caused much extra work and reduced vital production. Additional equipment, to increase production, was being considered at a cost of $36,000.

Improvements made through the use of three Delpark Filters increased production to such an extent that plans to purchase additional equipment were cancelled, at a substantial saving in capital investment to the customer. By supplying the grinding wheel with clean, filtered coolant for free, fast-cutting action, production quality was not only increased but expensive down time previously required for sump cleaning was eliminated.

Each filter uses fifty yards of filter material per month at a cost of $6.75 per month for filter material.

This case history is being repeated in numerous industrial plants throughout the country where Delpark Industrial Filters are supplying fine industrial filtering.

Let a Delpark Industrial Filtering Specialist show you the facts on the finest in Industrial Filtration. Write for more complete information.

PATENTS PENDING

Delpark

INDUSTRIAL FILTRATION

Backed by 30 Years Experience in Industrial Filtration

INDUSTRIAL FILTRATION CO. INC. LEBANON, INDIANA

CASTINGS YOU CAN LIFT WITH EASE

ALCOA makes four kinds in aluminum—sand, plaster, permanent-mold and die

You don't have to look farther than your own shop to see the advantages of castings that weigh one-half, even two-thirds, less. Think how often castings are lifted while being machined, finished, assembled, and shipped. The savings in man power with aluminum castings are impressive.

Look, too, at the other commercial advantages of Alcoa Castings. Ease of machining. Corrosion resistance. High conductivity of heat and electricity.

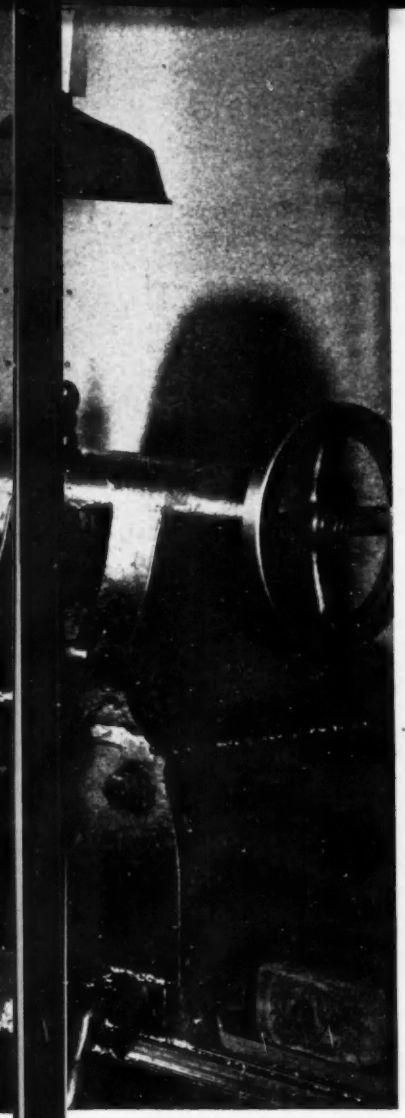
How about price? Alcoa Castings are competitive with castings of many other metals. Their cost, finished and assembled in your product, often amounts to surprising savings over heavy metals.

We have been making aluminum castings for 41 years. We have been working with aluminum for 64 years. To aluminum's natural advantages, we add the extra measure of sound and skillful design help. Any of our four foundries or two die-casting plants, located from coast to coast, are open for your inspection. Contact your local Alcoa Sales Engineer, listed under "Aluminum" in the classified phone book.

ALUMINUM COMPANY OF AMERICA

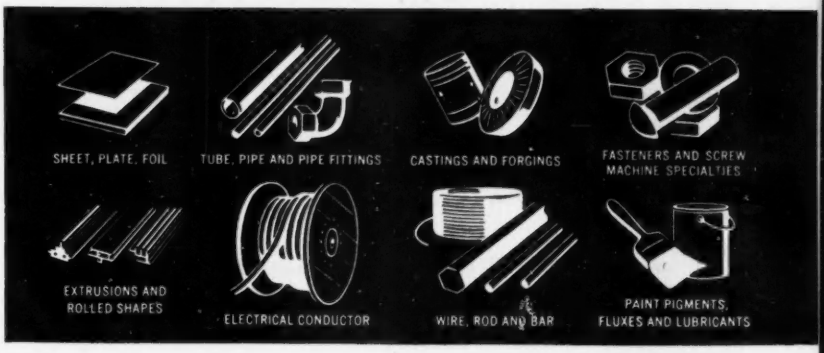
1903E Gulf Building • Pittsburgh 19, Pa.

ALCOA ALUMINUM ®



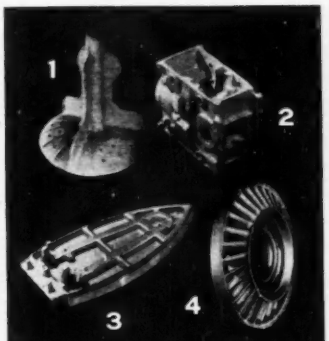
High production of permanent-mold castings in Alcoa's Cleveland foundry is illustrated by this automatic machine for making pistons.

Dimensional check of a completed die in Alcoa's die-casting plant at Chicago.

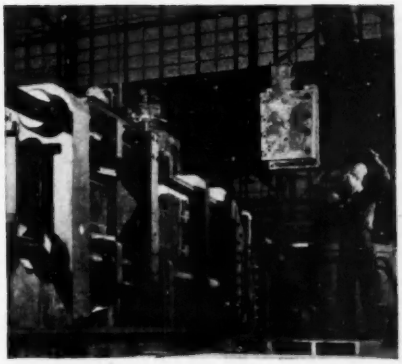


Remember, ALCOA makes "everything" in aluminum

While the sale of our products is limited by government regulations, you'll find no limitations on help in design, application, or fabrication.



Typical castings made by Alcoa. 1. Permanent-mold washing machine agitator. 2. Sand-cast machine part. 3. Die-cast electric iron soleplate. 4. Plaster-cast automotive torque converter.



Setting a die in a large die-casting machine at the Chicago plant.

A line of automatic molding machines, indicating the high production capacity for sand castings at Alcoa's Bridgeport, Conn., foundry.

Industry News

(*Continued from page* 23)

Goodrich Refutes Report of Lower Tire Prices

Despite the lifting of practically all controls from rubber and lower world prices for natural rubber, an early reduction in tire prices is not expected, according to B. F. Goodrich Co. In a letter to its dealers, the company points out that present replacement tire prices were established Nov. 1, 1950, and have not changed, although every major item of cost except crude rubber is now as high or higher than when present prices were established.

The company says further that freight rates recently have been increased, that tire companies have absorbed substantial general wage increase without raising prices, and that production costs cannot be reduced until synthetic rubber and rayon are obtainable below present price levels.

New Synthetic Elastomer Announced by DuPont Co.

At a recent meeting, the Rubber Div. of the American Chemical Society was told that small quantities of a promising new synthetic elastomer are being made in a DuPont pilot plant for evaluation of applications in the automobile, wire and cable, protective coating, mechanical goods, and other industries.

The elastomer is made by treating DuPont's polythene resin with chlorine and sulfur dioxide. The resulting product is a rubber-like material which reportedly can be readily compounded and processed in conventional rubber machinery.

One of its outstanding properties, the DuPont chemists said, is complete resistance to ozone, a constituent of the atmosphere long recognized as causing deterioration of natural and synthetic rubbers, including those used in tires, the rear deck gasket, and other parts of automobiles.

GE Announces Film on Small Motors

A 35-mm, black-and-white, sound film and allied literature on "Selection and Application of Fractional Horsepower Motors" have been announced by General Electric Co. The new film describes the broad uses of the motors in the home, on the farm, in factories, and offices.

(*Turn to page* 168, *please*)

Industry News

(*Continued from page* 166)

Chrysler Plane Parts Job Beats Schedule

Chrysler Corp. has announced that it is two months ahead of schedule on delivery of subassemblies for C-124 military cargo planes. Production of major wing and tail assemblies is being carried on by Plymouth Div. at the Chrysler Los Angeles plant.

Harvester Co. Cleared of Dealer Restraint

International Harvester Co. has been freed of charges of interference with free competition, brought by the Government in Federal Court for the District of Minnesota. The Government had charged that the company interfered with free competition by requiring its dealers to handle only International farm equipment. Actually, dismissal was requested by Government attorneys after a similar suit against J. I. Case Co. had been thrown out because of insufficient evidence.

Inco Official Describes Growth in Nickel Output

When current expansion programs are completed, total annual production of nickel in the free world will be roughly 375 million lb, an increase of 150 million lb, or more than 65 per cent, above that of the pre-war years, according to a recent report by Dr. John F. Thompson, chairman and president of International Nickel Co. of Canada, Ltd.

Dr. Thompson outlined progress of the huge underground development program of International Nickel, as well as other programs to expand nickel production. He pointed out, for example, that Falconbridge Nickel Mines, Ltd., Canada's second largest producer, is reported engaged in a program to increase its refined nickel production to 35 million lb annually.

Curtiss-Wright Starts Big Expansion Program

An industrial expansion program in Buffalo, N. Y., costing from $5 million to $10 million, has been announced by Curtiss-Wright Corp.'s Metals Processing Div. The program will require the employment of 1500 to 2000 additional workers.

The first phase of the operation will be the construction of a new $5-million plant to house administrative offices, engineering departments and a 100,000-sq ft machine shop.

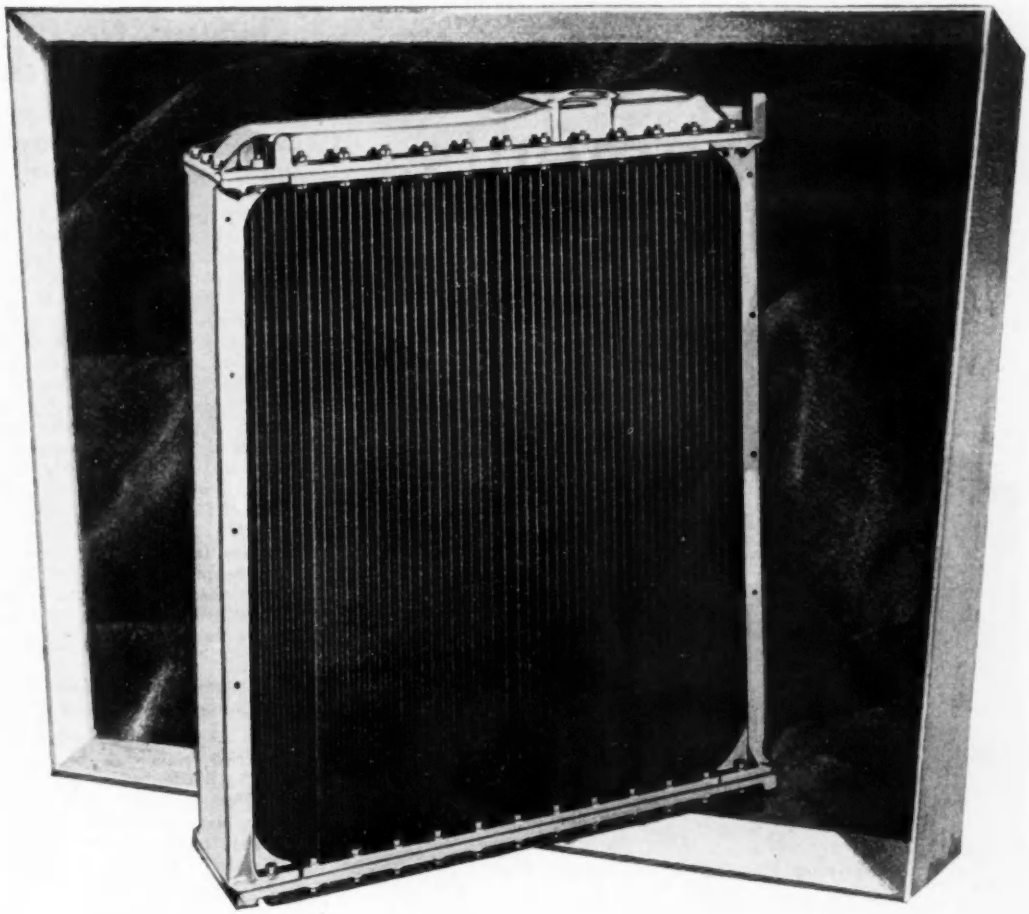
If the company's current negotiations with the Air Force to locate one of the world's largest steel extrusion presses in Buffalo for the manufacture of aircraft propellers are successful, a second new $5-million plant will be erected to house it.

Carboloy Dept. of GE Builds Plant in Mich.

Construction of a 90,000-sq ft permanent magnet manufacturing plant costing over $3.5 million is now under way in Edmore, Mich., by the Carboloy Dept. of General Electric Co.

The plant will represent a substantial increase over current manufacturing facilities for Carboloy's Alnico permanent magnets, currently being produced in Schenectady, N. Y. Permanent magnet marketing and engineering headquarters and facilities will be transferred from Schenectady to the Carboloy Dept.'s main office in Detroit, Mich.

(*Turn to page* 170, *please*)



Specialists in the Art of Keeping Cool

Balancing the engine cooling system calls for exact specification of radiator design and capacity.

Long radiators provide many of the leading vehicle manufacturers with the answer to this vital problem. As specialists, we provide the widest possible range of radiator capacities and designs.

This is our fiftieth year of radiator production. We offer our engineering and manufacturing experience—matching nearly the entire life of the automotive industry—to the manufacturer with problems of engine heat exchange.

LONG MANUFACTURING DIVISION
Borg-Warner Corporation
DETROIT 12, and WINDSOR, ONT.

ENGINEERING BW PRODUCTION

LONG

CLUTCHES • RADIATORS • TORQUE CONVERTERS
OIL COOLERS

Industry News

(*Continued from page* 168)

Aircraft Industry Net Profits Down in Face of More Output

Aircraft and parts manufacturers' net profits averaged only 2.2 per cent of sales in 1951, less than half the previous year's figure and substantially lower than the national level of 6.2 per cent for all manufacturing industries, according to a recent report by the Aircraft Industries Association. The sharp decline in aircraft profits last year occurred despite stepped-up plane production for defense.

Quoting figures from a National City Bank of New York survey, AIA reported that 29 representative aircraft and parts companies had net earnings of $57.560 million in 1951, a drop of 32 percent, or approximately $27 million from 1950. The aircraft industry ranked 23rd among 46 industries surveyed in terms of net assets but was 42nd in percentage of return on net assets.

Rhodes-Lewis Receives Ejection Seat Orders

An additional $750,000 order for crew-ejection seats has been announced by Rhodes-Lewis Co., a McCulloch Motors subsidiary. The order covers increased production of both pilot and radar-operator ejection seats for the Northrop F-89 Scorpion, new Air Force interceptor.

Douglas Div. Scheduled to Expand Considerably

Expansion of Douglas Aircraft Company's El Segundo Div. was forecast recently when the company announced a contract with the Navy to rehabilitate a World War II aluminum plant located at Torrance, Calif. The plant property, consisting of more than 200 acres of land and approximately one million sq ft of buildings, is being acquired by the Navy under condemnation action against the Columbia-Geneva Steel Div. of U. S. Steel Corp.

Boeing Stratofortress Makes Initial Flight

First phase of testing of the new Boeing XB-52 Stratofortress was completed recently when the big eight-jet heavy bomber returned to Seattle, Wash., just eight days after its initial flight.

(*Turn to page* 174, *please*)

Every help you carbide

Which can you use?

It's not difficult to design and apply cemented carbides to an ever-expanding range of applications in your plant. And by doing so, you'll get the tremendous plant-wide benefits that only super-hard carbides can give you.

But to make the job easier, faster, and to make sure that you get the *fullest* benefits possible, here are practical carbide helps *free* for the asking.

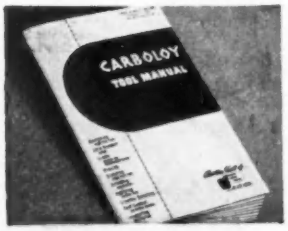
They are part of the Carboloy Service Program—a *comprehensive* program of personal and printed carbide aids that covers, individually or in combination, *every* question concerning the use of cemented carbides.

They'll help you increase production, lower downtime and maintenance, get longer tool life, better product finishes and fewer rejects . . . in short, increased tool efficiency.

Fill out the coupon for quick action on the services you'd like right now. (Why not save this advertisement, too, for future reference?)

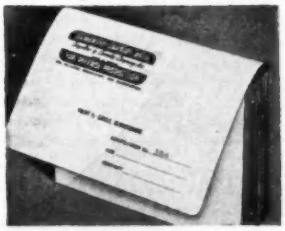
1 *FIELD ENGINEER:* Just the carbide expert to help solve a production bottleneck or tough machining problem—the Carboloy Field Engineer. He's wise in ways of getting peak tool and die performance through carbides, knows all the latest carbide techniques. He'll give you a hand in design and application of carbides to new jobs, or help you get greater benefits from carbides you now use. His services are FREE.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
World's oldest and largest producers of cemented carbides



2 *TOOL MANUAL:* A comprehensive, 200-page handbook that gives you basic data on the design, use and maintenance of carbides. Over 800 illustrations. Easy step-by-step details. 50c per copy (FREE to industrial supervisors).

3 *CCC PLAN BOOK:* Tells how you can get outstanding carbide benefits, *plant-wide*, through organized program of Coordinated Carbide Control. The "Triple C" Plan is tested, proved by hundreds of companies. Get Plan Book FREE!



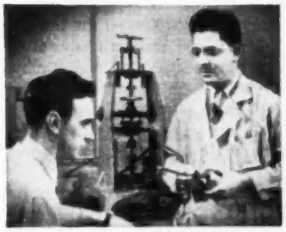
4 *SHELL MACHINING:* Highly practical, technical data for defense production for your in-plant use. This new, invaluable kit is for shell contractors only . . . typical of the great range of Carboloy literature available. Get yours FREE!

need for increased tool efficiency... FREE!

5 ***DIE ENGINEERING MANUAL:*** A well-illustrated, well-rounded manual that contains countless tips on application, design, fabrication and maintenance of carbide sheet-metal dies. Another in-plant Carboloy Service help. Yours FREE!

6 ***DRILLING DATA:*** Invaluable technical data on all types of drilling with carbides. Includes drilling cast iron with carbide twist drills, deep-hole trepanning, carbides in gun drilling, etc. You'll want this how-to-do-it data. FREE!

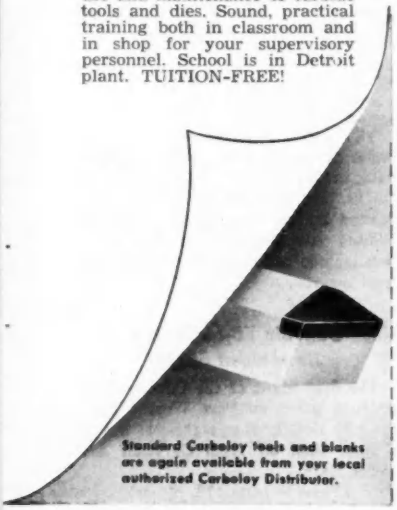
7 ***WOODWORKING DATA:*** Helpful material on use of carbides in woodworking. Shows how saws, router bits, joiner heads, cutters and other carbide-tipped tools modernize woodworking as they did metal cutting. Send coupon. FREE.



8 ***TRAINING SCHOOL:*** Excellent courses in all phases of design, application, use and maintenance of carbide tools and dies. Sound, practical training both in classroom and in shop for your supervisory personnel. School is in Detroit plant. TUITION-FREE!

9 ***STAFF OF ENGINEERS:*** For the more complex problems pertaining to the use of carbide tools and dies, there is a large staff of Carboloy engineers at the Carboloy Detroit plant. Send your specifications. Your problem is theirs. A FREE SERVICE!

10 ***LOCAL SERVICES:*** Your local authorized Carboloy Distributor also is a carbide expert. He maintains a well-experienced staff who can get out to your plant *fast*. Call him whenever you need carbides, or carbide helps. No obligation. FREE SERVICE!



Standard Carboloy tools and blanks are again available from your local authorized Carboloy Distributor.

----CLIP AND MAIL TODAY...FOR FREE CARBOLOY SERVICES----

CARBOLOY Department of General Electric Company
11151 E. 8 Mile Blvd., Detroit 32, Michigan

I am interested in your carbide services. Please send, without cost or obligation, the material, details or a Carboloy representative, as checked below.

☐ Field-Engineer Call ☐ Tool Manual ☐ Drilling Data ☐ CCC Plan Book
☐ Shell Machining Data (only if you are a shell contractor) ☐ Training School Details
☐ A Distributor-Representative Call ☐ Die Manual ☐ Woodworking Data

Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____

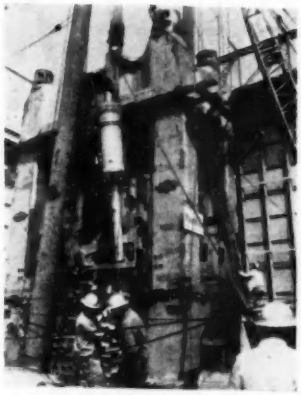
Industry News

(*Continued from page* 170)

Eddins, Matheny Retire From Chrysler Corp.

Chrysler Corp. has announced the retirement of two of its officials. D. S. Eddins, president of Plymouth Div. for more than 17 years, retired April 30 under the corporation's retirement program. Prior to joining Plymouth in 1933 he had been associated with General Motors Corp.. He was also with Studebaker Corp. and a railroad previously.

Chrysler also announced that H. R. Matheny retired after more than 40 years in the automobile and parts business, 24 of them with Chrysler. He had been in charge of the Highland Park plant for the last 20 years and vice president and general manager for the past year. He was associated with several automobile companies before joining Chrysler in 1928 as manager of the Dodge parts plant. He was named operating manager of the Highland Park plant in 1932.



POWERFUL PRESS

Seen in the process of assembly at the Burbank, Calif., plant of Lockheed Aircraft Corp. is a mammoth hydraulic press, designed and built by Birdsboro Steel Foundry & Machine Co. Weighing over 2,370,000 lb, the press is said to be as high as a four-story building. Walls and roof will be built around the press when installation is completed.

Construction Under Way on Waukesha Laboratory

Ground has been broken for the new experimental and research laboratory of Waukesha Motor Co., and preliminary construction is under way. The new building, estimated to cost about $175,000 will be one story in height, rectangular in shape, and will cover 18,000 sq ft.

Special interior construction and installation of facilities for the most modern experimental and research techniques for the further development of internal combustion engines will be included in the laboratory. Present plans call for the completion of the building in Jan., 1953.

Helicopter Forum is Set for Wash.

The Eighth Annual Forum of the American Helicopter Society will be held in Washington, D. C., May 15 to 18. In addition to 15 technical papers and a two-day air show at Bolling Air Force Base, the forum will include presentation of three annual awards.

Convair YB-60 Makes its Maiden Flight

The first flight of the Convair YB-60 took place at Fort Worth, Tex., recently when the eight-jet heavy bomber took off from Carswell Air Force Base.

(*Turn to page* 176, *please*)

Globe-Union Plates

help make your customers "battery happy"

Enlarged cross-section diagram of a Globe-Union plate dramatizes how structural sections of the grid are fully embedded in active materials to provide maximum working surface for power-producing oxides — plus other benefits.

Globe-Union's advanced plate design permits use of a greater amount of active materials. This design also assures greater coverage of the grid to prevent corrosion. Chemical setting of the porous lead oxide compound makes it more enduring and prevents it from shedding off the grid and shorting out the elements. This exclusive combination of features assures more satisfaction and extended life for the owner's battery dollar.

GLOBE-UNION INC. MILWAUKEE 1, WISCONSIN

Battery Production Plants At: ATLANTA, GA. • BOSTON, MASS. • CINCINNATI, O. • DALLAS, TEXAS • EMPORIA, KANS. • HASTINGS-ON-HUDSON, N. Y. • LOS ANGELES, CALIF. • MEMPHIS, TENN. • MINERAL RIDGE, O. • OREGON CITY, ORE. • PHILADELPHIA, PA. • REIDSVILLE, N. C.

Industry News

(*Continued from page* 174)

Reo Net Holds Steady Despite Tax Hike

A comparison of the first quarter profits of Reo Motors, Inc., with the similar period a year ago shows the serious effect of greatly increased federal taxes. During the first three months of this year Reo had a net profit of $690,000, compared with $674,000 in the corresponding period a year ago.

However, federal taxes this year are $1.83 million, compared with $1.036 million for the comparable period of 1951. This represents an increase of more than 75 per cent in taxes with no appreciable gain in earnings. Sales in the first quarter of this year were $37.2 million, compared with $25.8 million for the same 1951 period.

Purolator Sales and Earnings Set Record

New all-time records in both sales and earnings for Purolator Products, Inc., were shown in the recent annual report to stockholders.

Consolidated net income for 1951 totaled $1,595,051 on sales of $25,878,776. This compares with net income of $1,250,862 on sales of $16,281,956 in 1950. The wholly-owned subsidiary, Purolator Products (Canada), Ltd., reported 1951 net earnings of $104,833 on sales of $1,292,015 as compared with earnings of $38,449 on sales of $843,477 in 1950.

Jet Training Course is Offered by P & W

Apprentice training to qualify as jet engine metalsmiths will be offered to young men by Pratt & Whitney Aircraft Div. of United Aircraft Corp. The training course is aimed at alleviating a shortage of personnel equipped with the special new skills required for jet engine production. It will begin July 1 and extend over a three-year period.

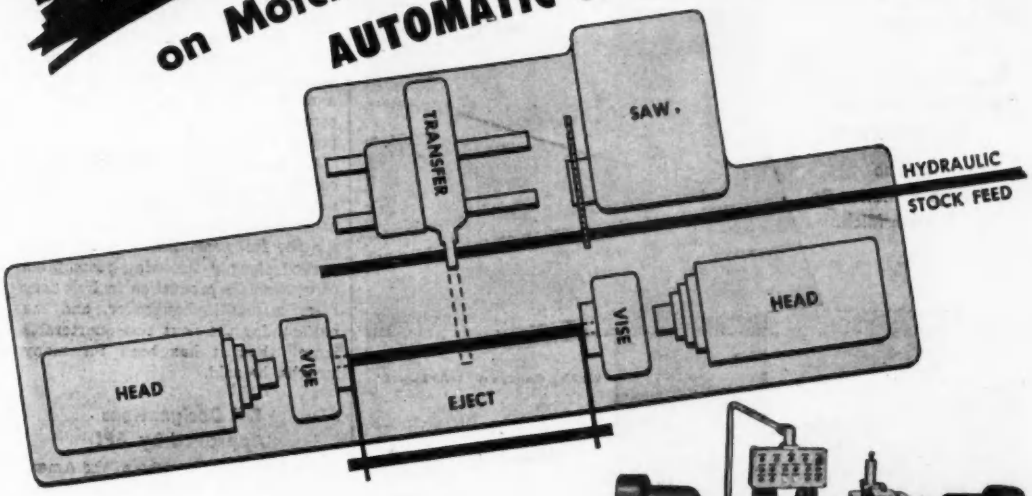
Ryan Awarded Contract for Exhaust Gas Unit

A contract for development and testing of an exhaust gas converter has been received from the Air Force by Ryan Aeronautical Co. Known as a "de-corroder," Model 57, the Ryan device is designed to remove from exhaust gases the chemical contaminants which attack aircraft materials.

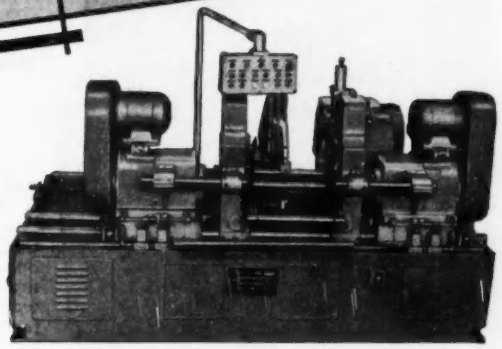
(*Turn to page* 178, *please*)

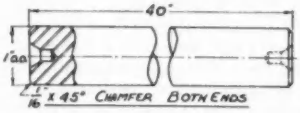
It's "Operation Combine"

on Motch & Merryweather AUTOMATIC TRANSFER MACHINES!

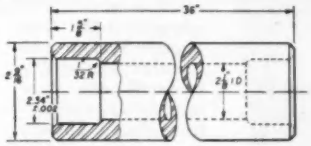


Machine both ends simultaneously and get the cut-off time free on Motch & Merryweather Automatic Transfer Machines. Save time, floor space and money. Get the details on your jobs! No obligation.





Operation: Cut off, chamfer and center drill both ends.
Material: SAE 1040 ground shafting.
Production: 240 pcs/hr.



Operation: Cut off; bore and chamfer inside and outside, both ends.
Material: SAE 1020 steel tubing.
Production: 140 pcs/hr. @ 100% eff.

Operation: Cut off, box mill, turn and center drill both ends.
Material: SAE 1020.
Production: 140 pcs/hr.

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY
715 PENTON BUILDING • CLEVELAND 13, OHIO
Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT

Industry News

(*Continued from page* 176)

Nash Earnings Suffer Sizable Reduction

Net earnings of Nash-Kelvinator Corp. for the first quarter of this year dipped very sharply below the same quarter a year ago. Earnings totaled $553,993, compared with $4,554,442 for the same period last year. Sales for the quarter were $72,437,197, compared with $107,016,823 a year ago. Earnings for the six months ended March 31 this year also showed a notable decline totaling $1,588,017, compared with $9,635,543 in the same period a year ago.

George W. Mason, president of the company, stated, however, that neither sales nor earnings are representative of what might be expected for the full year. Earnings have improved sharply following resumption of automobile production in February after a model changeover, and the outlook for the next two quarters is better than it has been for many months, he said.

Oil Designations Approved by API

The board of directors of the American Petroleum Institute recently approved a revision of automobile lubricating oil designations which had been recommended by its Lubrication Committee and Division of Marketing.

The revisions were concurred in by a special panel of the American Society for Testing Materials during the preliminary studies. The Lubrication Committee, in its recommendations, said the new system has no relation to the present SAE numbering system, which will be continued as is.

The new designations reportedly were developed to meet recent automobile developments, and especially those which lead to the introduction and use of several gradations of the heavy-duty type of lubricants. In addition to the ASTM, the automobile industry also has announced its support of the new classifications.

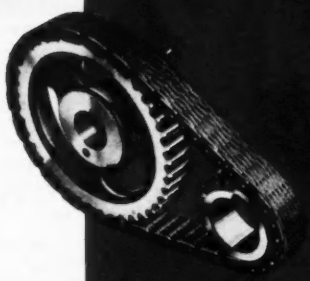
Cornell Extends its Aircraft Program

Cornell University has authorized $2.2 million for research at Cornell Aeronautical Laboratory, Inc., 90 per cent of whose work is military The allotment is part of $14.8 million for the university's research program underwritten by outside sources.

(*Turn to page* 180, *please*)

M=TC

Morse *means* Timing Chains



Thirteen makes of today's passenger cars use timing chains. Of the thirteen makes, eleven use precision-built, dependable Morse Timing Chains as original equipment. It almost goes without saying that Morse is the leading producer of automotive timing chain drives. M=TC; Morse *means* Timing Chains.

MORSE CHAIN COMPANY
Dept. 316 • 7601 Central Avenue • Detroit 10, Mich.

MORSE
MECHANICAL
POWER TRANSMISSION
PRODUCTS

PRODUCTS OF
BW
BORG-WARNER

Industry News

(*Continued from page* 178)

GM Again Awarded Honor for Safety

General Motors Corp. has earned its eighth National Safety Council award of honor for distinguished service to safety with its 1951 safety record the best in the company's 44-year history. Last year, 99.66 per cent of the more than 433,000 GM employees lost no working time because of occupational illness or on-the-job accident.

Company-wide accident frequency rate for GM last year was 1.78, an improvement of four per cent over the previous record set in 1950. The severity rate last year was .328, an improvement of 10 per cent over the previous year.

Borg-Warner to Close Superior Steel Unit

Borg-Warner Corp. will discontinue operations at its Superior Sheet Steel Div. at Canton, O., June 30. R. C. Ingersoll, president of the division, said the mill has operated for many years on a very close margin and that although it is one of the most modernly equipped hand sheet mills, it has been made obsolete by the modern wide strip mill

DEADLY MORTAR SHELLS AWAIT EARLY DELIVERY

Shell bodies for 81-mm mortar ammunition are lined up for shipment at the Dodge Forge plant of Chrysler Corp. in Detroit, Mich., where large quantities of them are being produced. The shells are shipped in large lots for other operations and for final assembly.

(*Turn to page* 182, *please*)

You Can See The Difference

ALUMICAST die casting quality assured because of expert scientific control

Here at **ALUMICAST**, we are equipped with the most modern laboratory and production equipment to turn out high quality die castings as well as permanent mold and semi-permanent mold castings of aluminum or magnesium. Castings that are flawless because every step, from ingot to finished casting, is rigidly supervised and is your assurance of expert scientific control second to none. This value, we call "**E.S.C.**", is vital to your business because it helps make good products better.

If you have a design problem or a production problem in which you believe a die casting or permanent mold casting might be the solution, let our nationally recognized authorities in research, metallurgy, engineering and production give you a helping hand. They will be more than happy to receive and analyze your blueprints and suggest an answer to your problem. No obligation, of course.

No matter where you are located, you will find **ALUMICAST** a quick and reliable source for quality castings. You are cordially invited to consult us relative to your civilian or defense needs. We have sales engineers and representatives in leading cities. If you don't know the name of the one nearest you, write direct to us.

ALUMICAST CORPORATION, 1521 N. Kilpatrick Avenue, Chicago 51, Illinois

ALUMICAST

ALUMINUM and MAGNESIUM PERMANENT MOLD and DIE CASTINGS

"E.S.C." EXPERT SCIENTIFIC CONTROL

Industry News

(*Continued from page* 180)

Removal of Credit Curbs Not Entire Sales Answer

With higher car production and sales nowhere near as easy to make as they were last year, dealers are increasing their clamor for removal of credit restrictions and have been joined by the Automobile Manufacturers Association in their campaign. However, it is highly problematical that removal of credit restrictions or modification to 24 months on time payment balances will supply the whole answer.

Actually, finance companies which handle dealer paper will impose their own regulations, and lifting of credit curbs may not be the effective remedy that dealers are seeking. In fact, there is some doubt that sales are as bad as some dealers claim. According to all reports, field stocks have been declining, and aggressive dealers actually would like to have more cars than they have been getting.

Buick to Up "Hardtop" Output 30 Per Cent

Popularity of the "hardtop" convertible is evident from Buick's plans to increase production of this model 30 per cent during the current quarter. Schedules call for an output of more than 26,000 hardtops, compared to 20,194 in the first three months of this year. It will account for 28.7 per cent of total output, the highest ratio since the model was introduced by Buick in 1949. Currently, one out of every three cars in the Super series is a hardtop.

K-F Stockholders Ask Audit of Finances

A group of Kaiser-Frazer Corp. stockholders has organized a protective committee to demand an immediate independent audit of the company's books. The committee charges "wasteful and inefficient management" permeates the company, and alleges that K-F is losing about $1 million a month.

Firm Organized to Produce Decorative Plastic Parts

A new organization specializing in the molding, painting, and plating of decorative thermoplastic parts for the automobile field has been formed by C. W. Krause. The new firm is Shawnee Plastics, Inc., 1801 West Iowa St., Evansville, Ind.

(*Turn to page* 184, *please*)

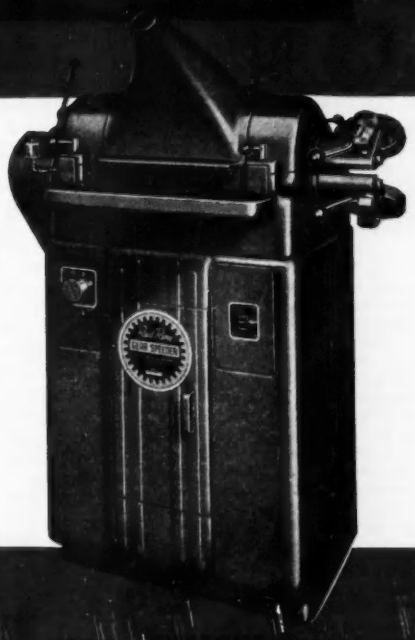
A RED RING SOUND TEST
is the Quickest Way to Screen Out
FAULTY GEARS

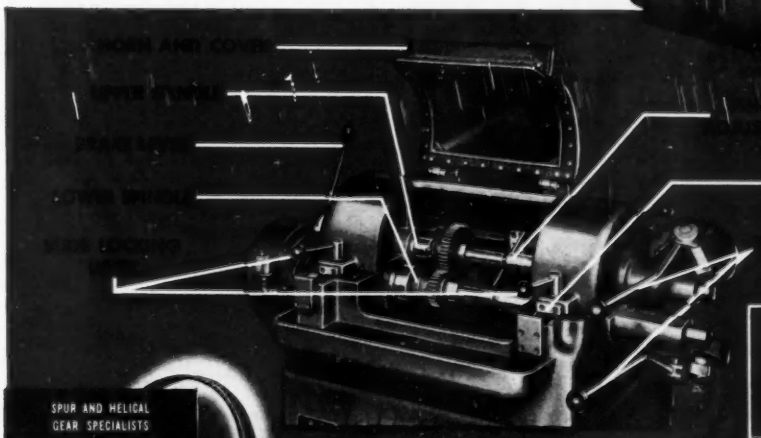
When a set of gears runs quietly and smoothly you can OK them for assembly with the assurance they will function properly in service. Such a test under varying speeds can be made easily and quickly by the average shop man.

If the sound test reveals objectionable noise the faulty gears are immediately routed back for correction. You won't waste time and expense by assembling them.

When you have a set of gears in the Sound Tester you can also check tooth bearing. Just use marking compound on one and observe its transfer to the mating gear. When the sound test reveals a nicked tooth the nick may be removed by a pencil grinder while the gear is still in the sound testing machine.

Special sound testing machines are available to meet individual requirements.





For More Detailed Description and Specifications *Write for* BULLETIN ST49-9

SPUR AND HELICAL GEAR SPECIALISTS

ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Industry News

(*Continued from page* 182)

Purolator Forms Subsidiary to Manufacture Transistor

Formation of a new subsidiary, Transistor Products, Inc., and purchase of a license from Western Electric Co., Inc., to manufacture a pea-sized substitute for vacuum tubes has been announced by Purolator Products, Inc.

The transistor, first developed by Bell Laboratories for communications use, has attracted attention because of its potentialities in electronics. The company has also made an agreement under which Scientific Specialties Corp., will complete development of equipment and apparatus for quantity production of the tiny device.

U. S. to Use British Aircraft Catapult

A new aircraft catapult, developed by the British Royal Navy, reportedly will be adapted for use on U. S. aircraft carriers.

Steam-operated, the catapult is said to launch planes from a hook connected to a piston working within a cylinder. The piston is forced forward by high-pressure steam from the ship's main boilers while a new sealing method keeps the cylinder air-tight.

du Pont Set to Mark 150th Anniversary

The 150th anniversary of the establishment of E. I. du Pont de Nemours & Co. will be marked July 18 at the site of the first du Pont powder mills on the banks of Brandywine Creek, a few miles from Wilmington, Del. The ceremonies, which will include a simple historical dramatic prologue, addresses by company officials, and the dedication of a marker on the site of the first plant, are the focal point of observances by the company.

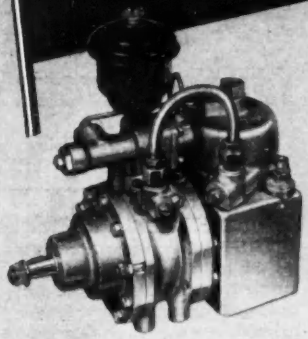
N. J. Turnpike Revenues Pass All Expectations

The 118-mile New Jersey Turnpike, which is only six months old, is expected to make a $5 million profit during its first year of operation, according to a recent statement by the operating authority. It was reported that twice as many vehicles are using the road as predicted at the start of the project and that 60 per cent are from out of state. The daily number of cars and trucks is said to average between 46,000 and 52,000.

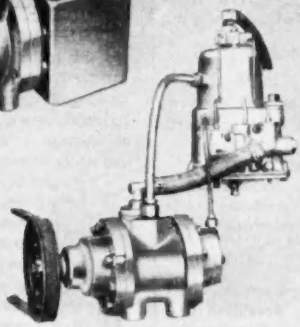
you get the air compressor that fits the requirements of your vehicles...

when you standardize on

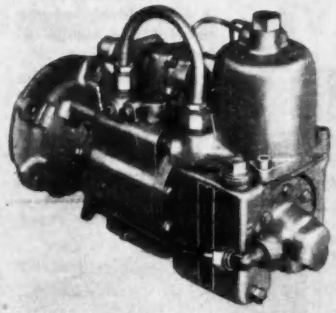
Wagner Air Brakes



Typical "Integral Unit" Type Rotary Air Compressor—Air Cooled—Base Mounted—Self Contained Lubrication.



Typical "Remote Dome" Type Rotary Air Compressor—Air Cooled—Base Mounted—Self Contained Lubrication. Used where clearances do not permit mounting the "Integral Unit."



Typical "Integral Unit" Type Rotary Air Compressor—Water Cooled—Flange Mounted—Engine Lubricated.

No single air brake system can adequately fit every application. Functional design of the vehicle . . . horsepower rating of engine . . . weight of load . . . number of axles . . . these are only a few of the factors that must be considered. Neither can one type of air compressor be applied to all types of vehicles. That's why Wagner Engineers have developed three compressors with pumping capacities of 7, 9 and 12 C.F.M. . . . flange or base mounted . . . belt or direct driven . . . either air or water cooled. These compressors utilize the rotary principle—known for high efficiency and troublefree service on all types of heavy-duty vehicles.

check these features:

- ✓ **Rotary motion** of all moving parts. Shaft is mounted on two bearings—Friction loss is low; operating efficiency high.
- ✓ **Uniform Torque Load**—Thousands of small overlapping air compression impulses per minute maintain a uniform load. Smooth quiet operation; long compressor life.
- ✓ **Plenty of Air**—High volumetric efficiency assures fast air recovery.
- ✓ **Pre-determined Air Pressure Range** automatically maintained.
- ✓ **Simple Air Pressure Adjustment**—A single, easily reached, pressure adjustment screw regulates the maximum air pressure delivered to the tank.
- ✓ **No Carbon Formation in Air Line**—Oil separation and cooling before air is discharged from compressor reduces the air temperature preventing carbon formation.
- ✓ **Compact**—Requires minimum installation space.
- ✓ **High Top R. P. M.**—Compressor can be operated as high as 2500 R.P.M., making high reduction drives unnecessary.

* * *

For real brake economy equip the vehicles you manufacture with Wagner Air Brakes. Wagner Engineers will be glad to work with you and to make recommendations as to the best Wagner Air Brake System for your particular vehicles. Coupon below will bring you copy of the latest Wagner Air Brake Catalog KU-201. Write for it today.

Wagner Air Brake Users are our Biggest Boosters!

Wagner AIR BRAKES — The Only System with The Rotary Air Compressor

the most reliable air compressor

Wagner Products Serve the Automotive and Electrical Industries

LOCKHEED HYDRAULIC BRAKE PARTS and FLUID
Hetol . . CoMaX BRAKE LINING . . AIR BRAKES . . TACHOGRAPHS
ELECTRIC MOTORS . . TRANSFORMERS . . INDUSTRIAL BRAKES

Wagner Electric Corporation
6363 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.
(Branches in principal cities in U. S. and in Canada)

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

KU-09

MEN *in the* NEWS

(*Continued from page* 25)

ACF-Brill Motors Co., Hall-Scott Motor Div.—**William B. McGorum** is now sales manager.

Aluminum Co. of America—**Gordon W. Cameron, Arthur P. Hall,** and **C. F. Nagel, Jr.,** have been elected vice presidents.

Minnesota Mining & Manufacturing Co.—**Alan H. Redpath** has been promoted to merchandising manager of all tape products, and **R. S. Frommer** now heads the tape group's Central Sales Inventory and Production Planning Dept.

Doehler-Jarvis Corp.—**R. H. Kitzman** has been appointed general production manager.

Cummins Engine Co., Inc.—**L. W. Beck, D. J. Cummins,** and **W. M. Harrison** have been elected to the board of directors.

Bunting Brass and Bronze Co.—**Alva L. Cremean** was recently made vice president in charge of manufacturing.

Solar Aircraft Co.—**Leon T. Noel** has been elected vice president and controller, and **Herbert Kunzel,** vice president and secretary.

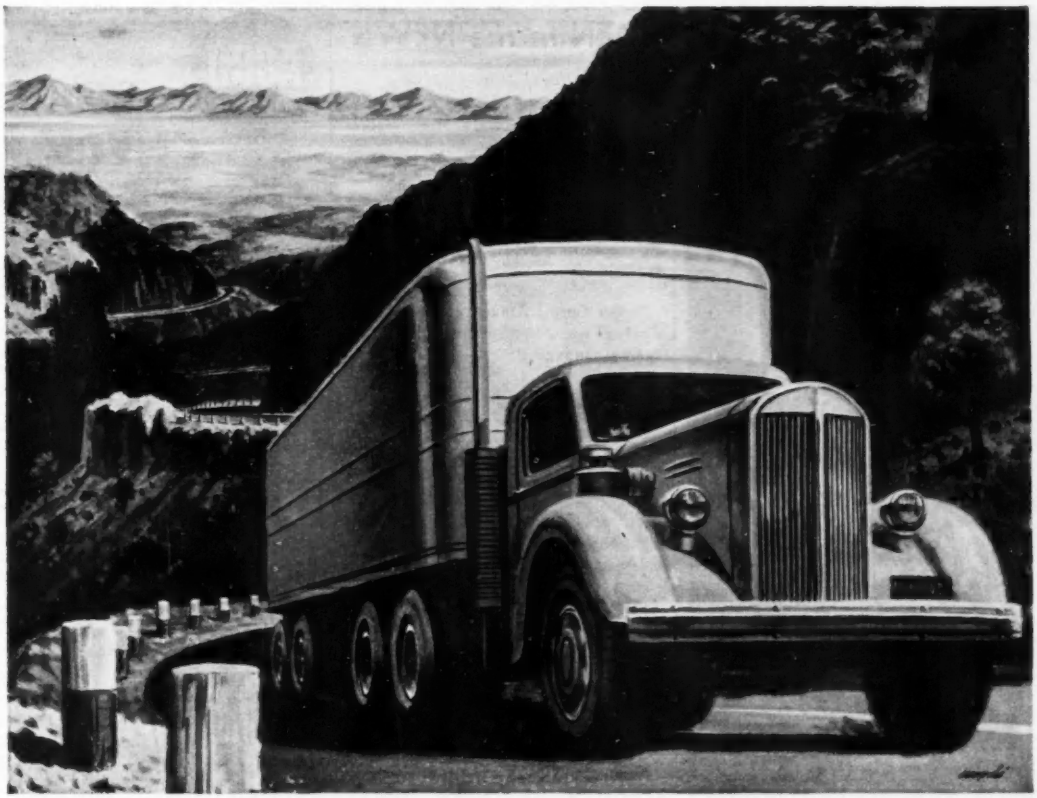
Verson Allsteel Press Co.—**N. J. Kassnel** has been made vice president in charge of engineering, and **Paul Kjelstrom** succeeds him as chief engineer. **Chris Zeilenga** is now chief engineer for research and development, while **Henry DeMatteo** has been appointed assistant works manager.

North American Aviation, Inc.—**Ronald H. McLeod** has been named Latin American representative.

General Electric Co.—**Wayne H. Perry** has been named associate secretary and **Ray H. Luebbe,** secretary. **Allen D. Marshall** heads the new Employee Benefit Plans Dept.

Curtiss-Wright Corp., Metals Processing Div.—**Theodore Tycocki** has been appointed works manager. **Frederic DeP. Townsend** is now manager of orders, sales and contracts, **Everett Loppacker,** industrial relations-manager, **William O. Fausak,** controller, **John Rickard,** manufacturing engineer, and **Richard C. Warndorf,** manager of quality control.

(*Turn to page* 188, *please*)



tough jobs—EVERYWHERE
demand AMERICAN BOSCH performance

Hauling heavy loads through broiling desert heat and cold mountain passes is all in the day's work for many over-the-road truckers. Dependable, fast schedules are their stock in trade—and that's why you'll find American Bosch products on the job.

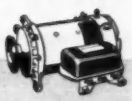
Many of the Diesel engines used to furnish the tremendous lugging power in these operations are equipped with American Bosch fuel injection systems—pumps, governors and nozzles that deliver the fuel . . . precisely timed and accurately metered to each engine cylinder, pressure atomized for maximum combustion efficiency.

Other American Bosch products, too, contribute to performance and safety—heavy duty generators and voltage regulators that furnish the required current for batteries and the numerous electrical accessories—electric windshield wipers that provide constant clear vision for drivers regardless of engine speed or load.

Over 40 years of pioneering design, precision manufacture and thoroughgoing service have built the American Bosch reputation for dependability in the toughest going. Continuous research, development and field engineering assure that this reputation will grow even stronger through the years. American Bosch Corporation, Springfield 7, Mass.

AMERICAN BOSCH

Automotive and Aviation Magnetos

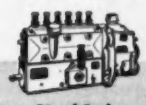


Generators and Regulators

Components for Aircraft Engines

All Electric Windshield Wipers

Ignition Coils



Diesel Fuel Injection Equipment

MEN *in the* NEWS

(*Continued from page* 186)

Douglas Aircraft Co., Inc.—**James Simpson** has been elected a vice president, and **M. A. Kavanaugh** has been promoted to controller.

Boeing Airplane Co.—**James E. Prince** is now vice president-administration.

Hupp Corp., Amgears Div.—**M. F. Frankel** was recently named manufacturing manager.

Bendix Aviation Corp., Radio Communications Div.—**R. B. Barnhill** has been chosen commercial sales manager.

E. W. Bliss Co.—**Dorcas Alker** has been appointed assistant secretary. **Lawrence J. Wimmer** was recently made eastern service manager.

Buffalo Arms, Inc.—**Harold J. Miller** has been named assistant to the president.

Piasecki Helicopter Corp.—**Gareth W. Speer** is now financial vice president.

Champion Spark Plug Co., Ceramic Div.—**Dr. James S. Owens** has been made assistant to the manager.

AiResearch Manufacturing Co.—**S. K. Anderson** has been promoted to chief engineer.

Beaver Tool & Engineering Corp.—**W. E. Vogel** was recently named sales manager.

AiResearch Manufacturing Co. of Arizona—**Ivan Speer** has been named engineering manager.

Firestone Steel Products Co.—**L. J. Campbell** has been appointed president.

Nash-Kelvinator Corp.—**William H. McGaughey** has joined the organization as assistant to the vice president.

Kollsman Instrument Corp.—**Herman Bergman** is now director of statistical research.

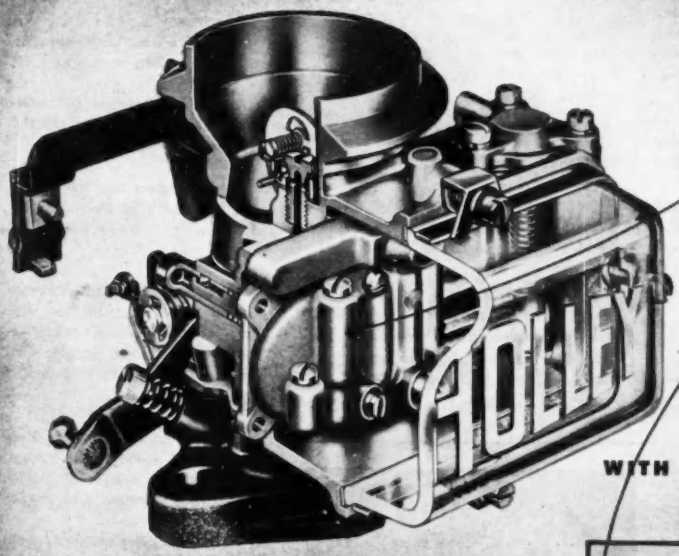
A. Harold Frauenthal, Inc.—**Richard Couch, Jr.,** is now sales manager.

D. A. Stuart Oil Co.—**L. B. Perkins** has been named vice president, treasurer, and general manager.

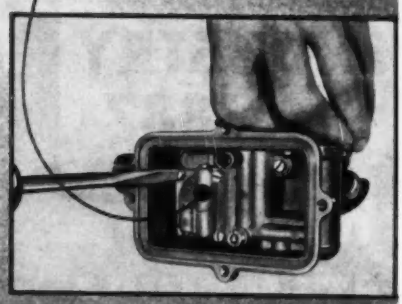
(*Turn to page* 190, *please*)

DESTINED TO REVOLUTIONIZE THE SERVICING OF CARBURETORS

The Holley Visi-Flo



WITH THE REPLACEABLE METERING UNIT



In the past, service departments of car and truck dealers have had to maintain cumbersome stocks of *May* carburetor parts. Vehicle manufacturers have urged servicemen not to patch up old carburetors or to replace them with rebuilt models but to buy and install *New* factory-built carburetors. Owners of cars in the low priced field have protested that it will cost too much.

The Holley Visi-Flo will change that!

Servicing the Holley Visi-Flo requires just four simple steps. For the first time, all metering parts are contained in one complete assembly which can be easily, quickly, and inexpensively replaced. The Visi-Flo is Holley Model 1904. It is a single downdraft carburetor for 80-120 H.P. engines.

FOR MORE THAN HALF A CENTURY—ORIGINAL EQUIPMENT MANUFACTURERS FOR THE AUTOMOTIVE INDUSTRY

HOLLEY Carburetor Co.

DETROIT 4, MICHIGAN

MEN *in the* NEWS

(Continued from page 188)

General Motors Corp., Oldsmobile Div.—**A. E. McRae** has been appointed general superintendent of the new jet engine parts plant.

Gar Wood Industries—**H. H. Hippler** is now assistant director of sales and advertising. **R. F. Whitworth** succeeds him as manager of the Branch Div. **Ross Miller** is the new vice president and general manager of the National Lift Co., a subsidiary.

Minneapolis-Honeywell Regulator Co., Industrial Div.—**John A. Robinson** has been named sales manager of the Eastern and Mid-Atlantic regions.

Metals Disintegrating Co., Inc., Harrison Abrasive Div.—**Louis A. Knolke** has been appointed sales representative.

KSM Products, Inc., Stud Welding Div.—**Claude Batuk** is now sales engineer.

General Motors Corp., Buick Motor Div.—**Donald F. Taylor** and **Joseph F. Schweinfurt** have been appointed general superintendents in charge of automotive production.

Clover Manufacturing Co.—**Russell E. Potter** has been chosen abrasive sales engineer.

Glenn L. Martin Co.—**Howard W. Merrill** is now chief electro-mechanical engineer.

General Motors Corp., AC Spark Plug Div.—**Joseph K. Decker** has been appointed assistant director of purchases.

Besly-Welles Corp.—**K. A. Hill** has been made advertising manager.

Pittsburgh Screw and Bolt Corp.—**Alexander I. Stayman** has been elected vice president-sales.

Sundstrand Machine Tool Co.—**Gilmore J. Landstrom** has been elected vice president and treasurer, and **Burnell A. Gustafson** has been made vice president in charge of the Machine Tool Div.

General Electric Co.—**Robert H. Krieble** is now engineer in charge of the Thomson Laboratory at the Lynn (Mass.) River Works.

Transco Products, Inc.—**William P. Stratton** has been named manager of contract administration and director of advertising and sales promotion.

Fairchild Engine & Airplane Corp.—**F. E. Newbold, Jr.**, has been elected a vice president.

Armstrong Rubber Co.—**William G. Downs, Jr.**, has been appointed field sales promotion manager.

Air Reduction Co., Inc.—**George V. Slottman** was recently elected a vice president.

Westinghouse Electric Corp., Aviation Gas Turbine Div.—**H. R. Arnold** has been appointed assistant to the manager.

Vanadium Corp. of America—**Bert O. Brand** has been elected vice president and secretary, while **John J. Spollen** has been made controller. **James T. Towne** is now assistant to the vice president.

Electric Auto-Lite Co.—**Robert M. Sellers** and **Robert W. Munger** now manage the foundries at Fostoria, O., and Mount Vernon, Ill., respectively.

Lynch Corp.—**Russell L. Sears** was recently elected a vice president.

Tinnerman Products, Inc.—**George J. Schad** has been elected treasurer and **Robert C. Overstreet**, secretary.

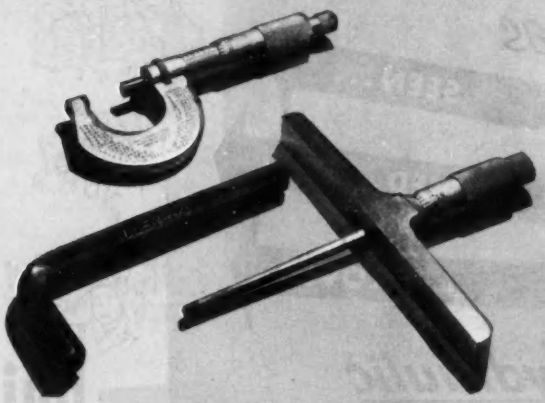
Buda Co., Engine Div.—**J. C. Baseheart** has been appointed general sales manager.

Bulldog Electric Products Co.—**John P. Bennett** is now manager of market research and analysis.

Continental Motors Corp., Military Div.—**S. T. Williams** has been made manager of engineering.

Chrysler Corp.—**Arthur C. McCarroll** is now director of public information for the Chrysler Motors Los Angeles, Calif., plant and the Dodge San Leandro, Calif., plant. **Theodore R. Patrick** has been named general manager of the Highland Park, Mich., plant, succeeding **H. R. Matheny**, retired.

Chrysler Corp., Amplex Div.—**Leslie Touluse** has been chosen plant manager of the Detroit, Mich., plant.



Standard symbols for **PRECISION**

A "mike" and an Allen Key keep steady company wherever precision measurements and precision adjustments go hand in hand . . . and where positive locking and vibration-free performance are important to maintaining precision.

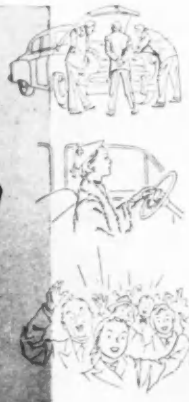
Look for the First Name in precision screws at the Industrial Distributor who stands first in *his* field in your locality. He has the stock, the experience, and a wealth of specific information on applications for precision fastenings that you will find invaluable.

Now the public has

SEEN...

TRIED...and

APPROVED



SAGINAW *Hydraulic* POWER STEERING

*Now on 1952 model Oldsmobiles, Buicks and Cadillacs

Saginaw hydraulic power steering is in the news! Recently, the general public caught its first glimpse of this wonderful new device on passenger cars. Shown on 1952 model Oldsmobiles, Buicks and Cadillacs in showrooms across the country, it captured the imagination of the public. Thousands tried it—and approved of what they found. For "there is no steering like *power* steering . . . and no power steering like Saginaw hydraulic power steering."

Already Saginaw power steering has proved its value . . . proved it on thousands of commercial vehicles since it was introduced in 1939 to make the steering of heavy-duty trucks and buses easier and safer. And during World War II many of America's giant tanks were Saginaw equipped.

Saginaw power steering can be easily adapted to any make or model automobile, and Saginaw engineers are available to work with car manufacturers at any time on new applications.

Remarkably simple in design, Saginaw power steering has fewer moving parts, fewer parts in all. "Wheel pull" is easily adjusted to the individual requirements of any car.

Write Saginaw Steering Gear Division of General Motors for full details.

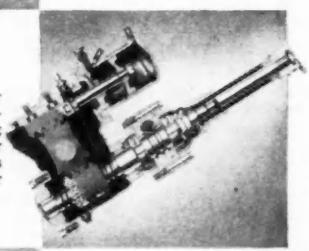
IF IT'S EASY TO STEER . . . IT'S A SAGINAW GEAR

This...

Saginaw's recirculating ball steering gear provides almost frictionless operation that no other type of gear can equal. This principle has been proved on over a million automotive steering gears.

Plus this...

Saginaw's hydraulic power steering gear gives a tremendous lift to driving ease. A hydraulic booster does the work . . . replaces driver effort with power steering.



Equals this...

Parking is a simple matter in a car equipped with Saginaw power steering. The smallest woman can spin the wheel of the biggest car with finger-tip ease.

* *Optional equipment at extra cost.*

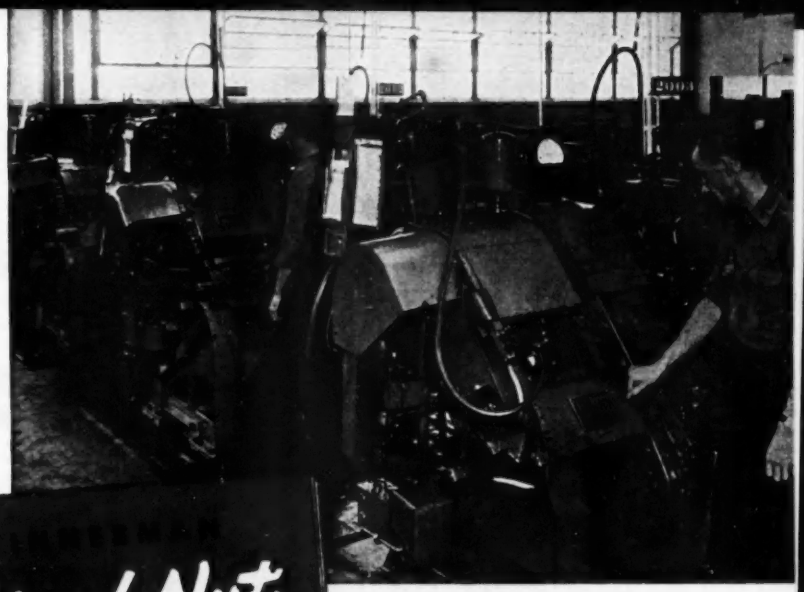
Saginaw

STEERING GEAR DIVISION

General Motors Corporation, Saginaw, Michigan

SSG PRODUCTS

STEERING GEAR ASSEMBLIES • STEERING LINKAGE ASSEMBLIES • PROPELLER SHAFTS • DIESEL ENGINE AND AIRCRAFT PARTS



Behind

stand these Bliss Presses

When it came to high-volume, low-cost production of its famous Speed Nuts, Tinnerman Products, Inc., turned to Bliss High Production presses. That is because Bliss HP presses provide definite operating advantages, especially on high-speed, progressive die operations.

Here's how the Bliss design cuts vibration and deflection to a minimum; maintains high output and long die life:

- Crankshaft with oversize crankpins supported in heavy box-type crown
- Frame of high-tensile, fine-grained Meehanite with heavy sections minimizing deflection
- Slide guided in bronze-lined square gibs throughout entire stroke and adjustment. Gibs are aligned to extremely close tolerances for very accurate slide guidance
- Rolls and feed adjustments built-in for precision feeding
- Compact design for high-speed operation
- Die area easily accessible from both front and rear of press for ease in setting complicated multiple-station dies.

If your metal stampings involve high-volume production and/or progressive die operations—you will find it worth your while to investigate Bliss HP presses. Let a Bliss sales engineer tell you about the large range of sizes, the full significance of these design features. Write for catalog.

E. W. BLISS COMPANY, CANTON, OHIO

E. W. Bliss (England) Ltd., Derby, England
E. W. Bliss Company (Paris), St. Ouen sur Seine, France
Presses, Rolling Mills, Special Machinery

"One or Several Copies Are Needed in Any Shop Doing Stamping Work" ...*American Machinist*

Completely New

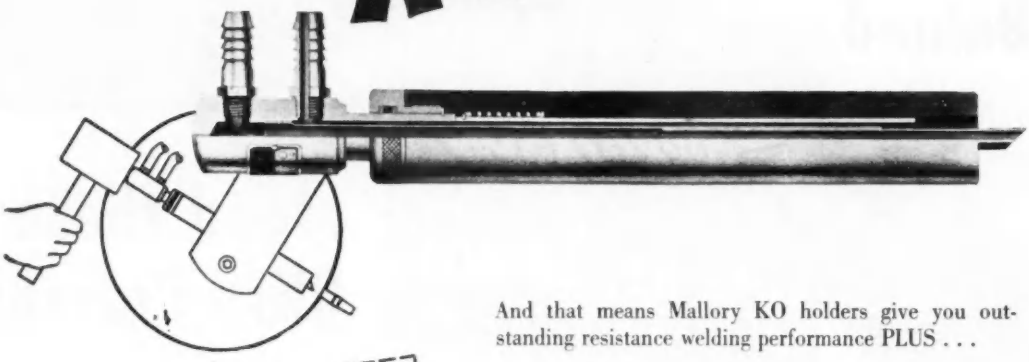
700 Pages • 450 Illustrations

Sections on: Computing press jobs • Selecting proper press • Useful engineering tables • Die illustrations • Complete glossary. Plus a service section for Bliss presses. **$7.50**

E. W. BLISS COMPANY—Handbook Dept., Canton, Ohio

From a single press for a given job... to a complete press room... **It's Bliss!**

You can be sure of efficient cooling action with MALLORY leak-proof KO Holders



RESISTANCE WELDING "TEAMWORK" THAT SAVES YOU TIME AND MONEY

When you decide on Mallory holders you have a large, standardized variety to choose from—all designed to give top welding performance at lowest possible cost.

And when you team these holders with the wide range of Mallory electrodes, you get an almost infinite variety of combinations which cover 'most any welding job you want done—thus saving the time and cost of special designs.

You can count on Mallory for outstanding, low-cost welding performance and engineering service whenever you need . . .

Electrodes	Holders
Dies	Rods & Bars
Castings	Forgings

And that means Mallory KO holders give you outstanding resistance welding performance PLUS . . .

- **More effective cooling**
- **Longer electrode life**
- **Easier operation**
- **Positive tip ejection**

Here are the exclusive Mallory features that mean low-cost, trouble-free welding for you . . .

- **O-Ring seal construction to prevent leaks**
- **Alloy, brass and stainless steel construction to prevent corrosion**
- **Special design to permit maximum cooling action**

From any standpoint—cost, performance, service—you'll find it pays to use Mallory KO holders always. Get details today from your distributor.

In Canada, made and sold by Johnson Matthey and Mallory, Ltd. 110 Industry St., Toronto 15, Ontario

P.R. MALLORY & CO. Inc.

MALLORY

SERVING INDUSTRY WITH

Electromechanical Products—Resistors • Switches • TV Tuners • Vibrators
Electrochemical Products—Capacitors • Rectifiers • Mercury Dry Batteries
Metallurgical Products—Contacts • Special Metals • Welding Materials

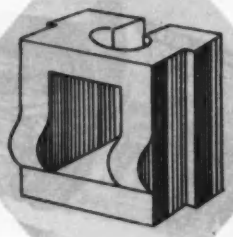
P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

For information on Titanium Developments contact Mallory-Sharon Titanium Corp., Niles, Ohio.

You can't take a chance with a BREECH RING

. . . NOT WHEN THE FORGING COSTS $1100.00!

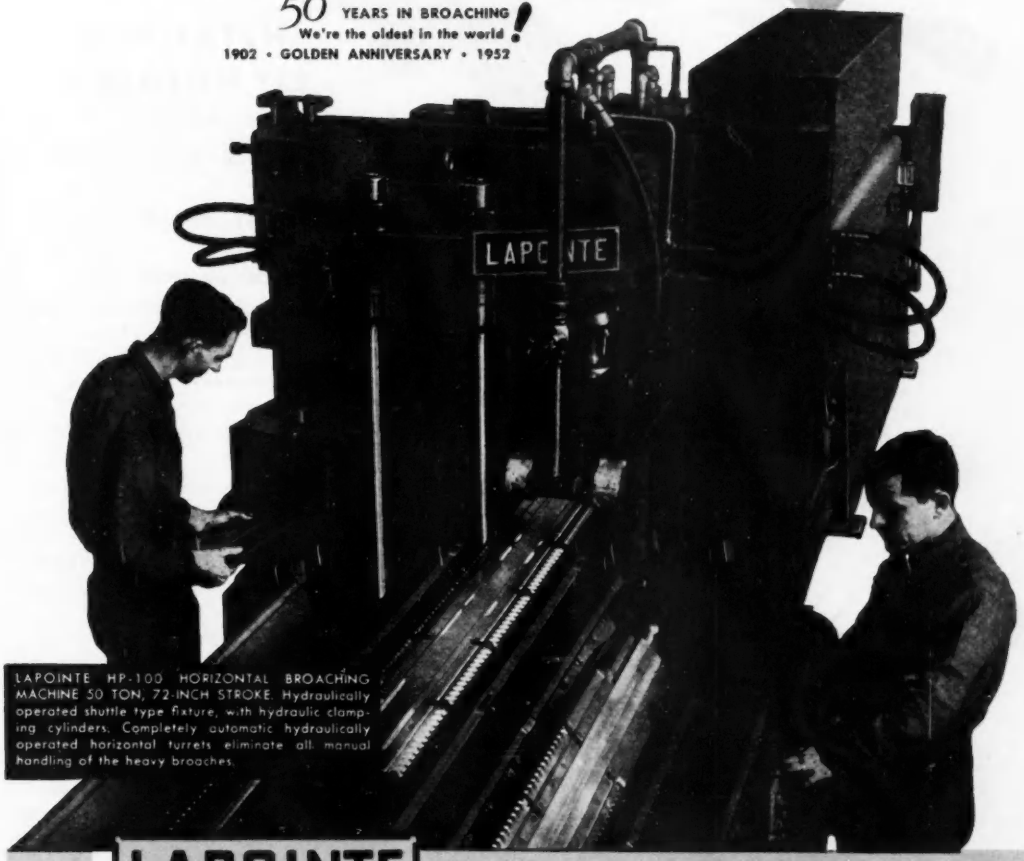
LAPOINTE



BROACHING eliminates the worry and the risk of spoilage, in machining this heavy Breech Ring . . . and does it with relatively unskilled men! Close tolerances and fine finish are automatically obtained with this LAPOINTE two-machine setup, which has proved to be so successful with Arsenals and sub-contractors on 90 mm guns. Production speed is impressive, too: **one completely broached part every 50 minutes!**

Send today for our special bulletin on horizontal broaching machines. Ask for HP-10.

50 YEARS IN BROACHING
We're the oldest in the world!
1902 • GOLDEN ANNIVERSARY • 1952



LAPOINTE HP-100 HORIZONTAL BROACHING MACHINE 50 TON, 72-INCH STROKE. Hydraulically operated shuttle type fixture, with hydraulic clamping cylinders. Completely automatic hydraulically operated horizontal turrets eliminate all manual handling of the heavy broaches.

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
Branch Factory: Watford, Herts., England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

New

HY-PRO

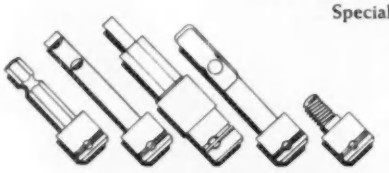
PHILLIPS
INSERT BITS
BIT HOLDERS
AND
HAND DRIVERS

HY-PRO...HIGH PRODUCTION PRODUCTS

NEW...HY-PRO-Phillips Insert Bits

This new, low-cost removable insert bit comes in four sizes. It outwears ordinary Phillips bits two to four times. The #2 size drives from 75 to 80% of all Phillips recessed screws. When one bit wears out it is easily and inexpensively replaced. Clearly labeled and packed in lots of 25 in transparent bags, or in lots of 100 in sturdy cardboard boxes.

Long Life—Perfect Fit. Made by Hy-Pro but sold by Continental Screw, these new high production, Hy-Pro Insert Bits employ the same master tools used to form the recess in Holtite-Phillips recess head screws. This insures a perfect mated fit. Specially heat-treated alloy steel and a unique "Reverse Cold-Heading Process" assure lasting wear and keep this "The Long Life Bit with a Perfect Fit."



NEW...HY-PRO-Phillips Bit Holders

Made in standard sizes to fit all types of high production power driver, these adapters are equipped with positive ball-and-spring lock to hold bit firmly and still make replacement easy. Magnetic holders also available on order.

NEW...HY-PRO-Phillips Hand Drivers

Ideal for factory line or home workshop, this new driver comes in sizes #1, #2, #3 and #4 to take corresponding insert bit sizes. Made to highest Hy-Pro Standards. Packed Six Drivers to the specially designed counter display box, each driver complete with one Hy-Pro-Phillips bit.

Send at once for free folder describing these new Hy-Pro products in detail.

CONTINENTAL SCREW COMPANY INC. 1904

You can count on Continental

CONTINENTAL SCREW CO., NEW BEDFORD, MASS.

How many horses will he use in '62?

Tomorrow's farmer will want a lot more "horses" . . . and he'll want most of them on wheels! He'll want *horsepower* for farm engines that plow, sow or reap.

Improved castings, being designed *now* by Campbell, Wyant and Cannon, will make those engines better . . . will help the farmer do more. And such castings also mean new opportunities for farm equipment makers planning new machinery to increase farm mechanization still further.

Thus, the foundry serves the farm as well as the factory . . . and at CWC there is consistent emphasis on making this service more productive *today and tomorrow* through advanced metallurgical engineering, precision control and mechanized production.

CAMPBELL, WYANT AND CANNON FOUNDRY COMPANY, MUSKEGON, MICHIGAN

Foundries in Muskegon, South Haven and Lansing, Michigan

. . . serving the automotive, farm equipment, railroad and marine industries and the Armed Forces

CAST CYLINDER HEADS AND BLOCKS

CAST PISTONS

CAST CAMSHAFTS

CAST CRANKSHAFTS

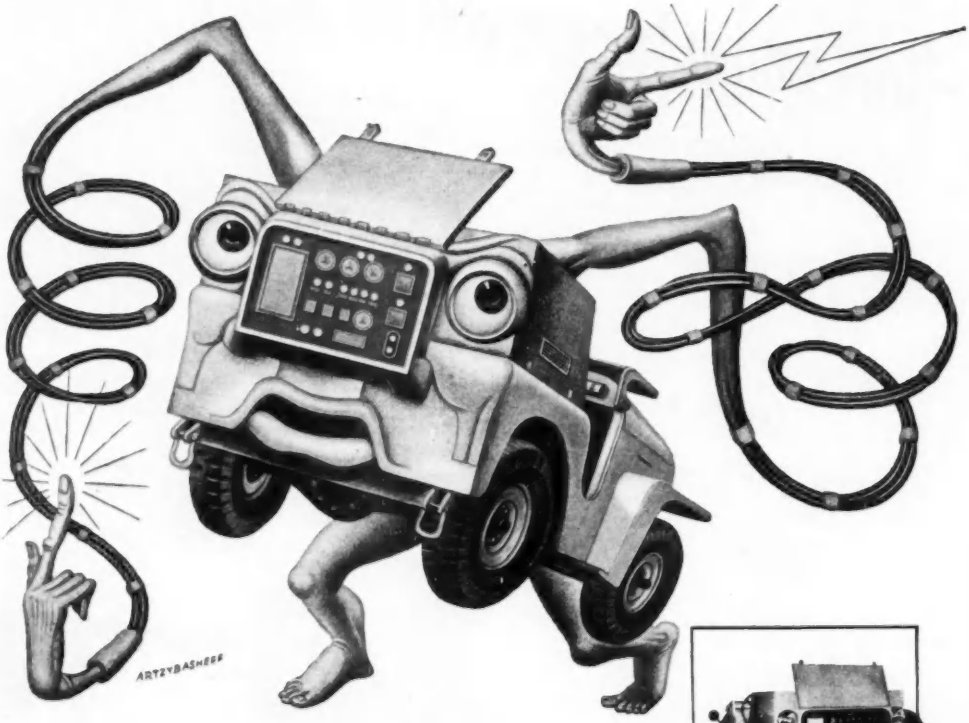
CAST GEARS

CENTRIFUGALLY CAST CYLINDER LINERS

CENTRIFUGAL BRAKE DRUMS

CWC

Since 1908

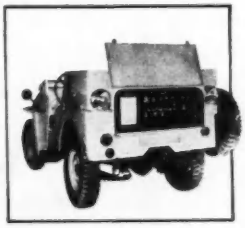


Meet a power generator with "legs"

Now, the same self-propelled generator that starts jets and bombers offers its mobility and versatility for numerous industrial purposes—air compression, emergency power, pumping and other applications. Generating 30 volts, developing 120 h.p., dependable in temperatures from −65°F. to +135°F.—this many-purpose unit moves under its own power . . . and may be used for a towing vehicle as well.

If you have an application for an air-cooled power package of this type—or if your need is precision machining, product development, or high-volume production—call on Lycoming. Long famous for aircraft engines, Lycoming also meets the most exacting and diverse requirements in many fields, both military and industrial.

Whatever your problem—look to Lycoming!



Unique in its field, this all-purpose power package *propels itself* over the roughest terrain—another **outstanding development of Lycoming research and precision production.**

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME-MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

LOOK TO LYCOMING FOR RESEARCH FOR PRECISION PRODUCTION

LYCOMING-SPENCER DIVISION, WILLIAMSPORT, PA.
BRIDGEPORT-LYCOMING DIVISION, STRATFORD, CONN.

AVCO MANUFACTURING CORPORATION

How to reduce your costs with Pre-Coated Thomas Strip

Here's a profit-building idea for any light metals fabricator—combine the functional properties of non-ferrous metals with the utility and economy of cold-rolled strip steel by using *pre-coated* Thomas Strip to speed operations and cut costs.

In many instances with Thomas Strip, all you have to do is fabricate and assemble—expensive surface preparation and plating operations are eliminated. It resists corrosion during processing and serves as the final inside and out finish—or as a base for further plating. Tinning, soldering and brazing operations are made easier with many of the coatings.

Thomas Strip fabricates readily—most of the coatings lubricate dies—stretch die life—give greater production per grind. Coating is unitized with the strip steel base of controlled metallurgy and proper ductility—adheres tightly even during severe forming, drawing and rolling operations.

In addition to the many cost-reducing advantages of making your products from pre-coated Thomas Strip, you improve their appearance—give them added luster and sales appeal. For assistance in selecting pre-coated strip for your operations, write today.

Cold-rolled strip steel electrolytically pre-coated with Zinc, Copper, Brass, Nickel, Lead-Alloy and Chromium in Natural, Planished and Buffed Finishes—Hot Dip Tin and Lead Alloy Coated—Lacquer Coated in Colors—Annealed Spring Steel—Alloy Strip Steel—Uncoated Strip Steel, carefully produced to your specifications.

Thomas Strip

a product of

Pittsburgh Steel Company

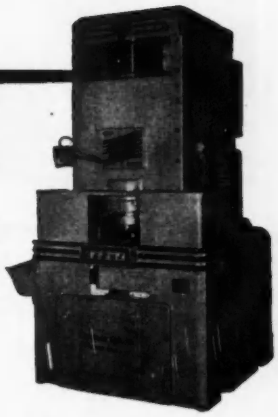
Thomas Strip Division · Warren, Ohio

AIRCRAFT GEARS Faster!

Sure, you can produce precision aircraft gears by slow methods . . . but, WHY do it that way when there is a quick way to do the same thing?

The fastest proven methods to cut precision gears, as used in aircraft, are:

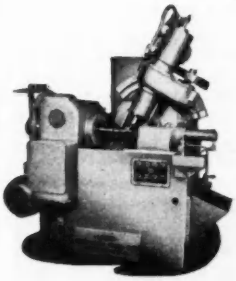
SPUR GEARS



Step 1: Cut all teeth simultaneously on a Michigan Shear-Speed gear shaper. (For time and tolerances, see example at left.)

Step 2: Finish the gears by Michigan "Underpass" (★) shaving, the fastest of all gear finishing methods.

Note: If "ground gears" are specified, Underpass shaving will cut your grinding time in half at negligible cost for the shaving operation.



HELICAL GEARS

Step 1: Hob the teeth on a Michigan #1458 high-speed hobber—the fastest single spindle hobber in the world . . . *faster than most multiple-spindle machines.*

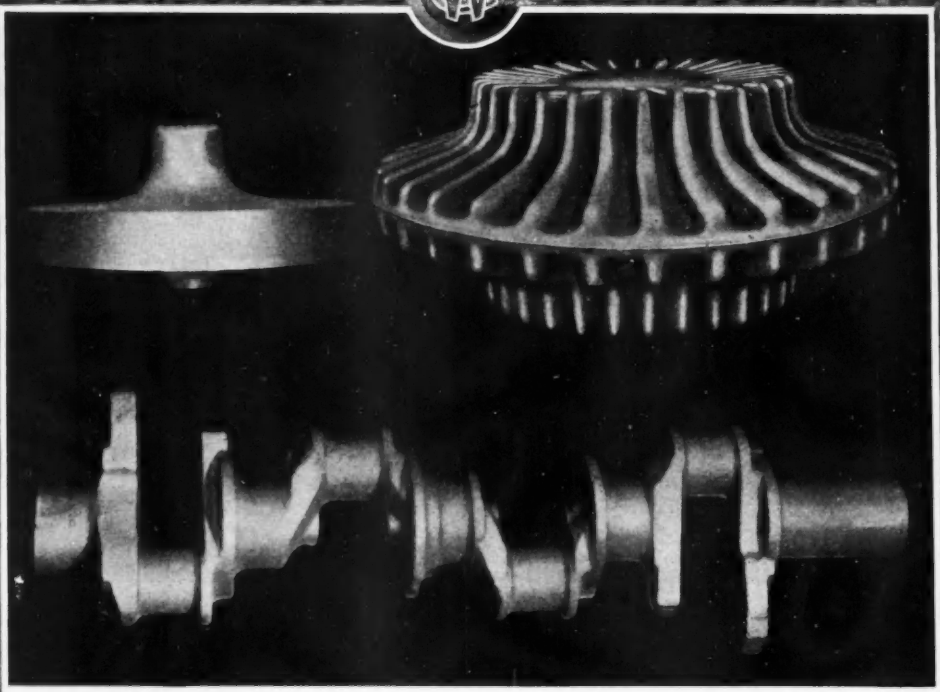
Step 2: Finish as for Spur Gears.

★ *On aircraft pump gears, it may be desirable to use 'Modified Underpass' or 'transverse' shaving, depending on length of run, face width, etc.*

MICHIGAN TOOL Company

from blank to finished gear

7171 E. McNICHOLS RD. • DETROIT 12, MICHIGAN, U. S. A.



Wyman-Gordon — specialists in the vital forgings of the internal combustion engine since its inception — is today the largest producer of crankshafts for the automotive industry and of all types of forgings for the aircraft industry. Be it crankshafts and other vital forgings for the piston type engines or turbine wheels and impellers for turbo jets — there is no substitute for Wyman-Gordon experience.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

WORCESTER, MASSACHUSETTS

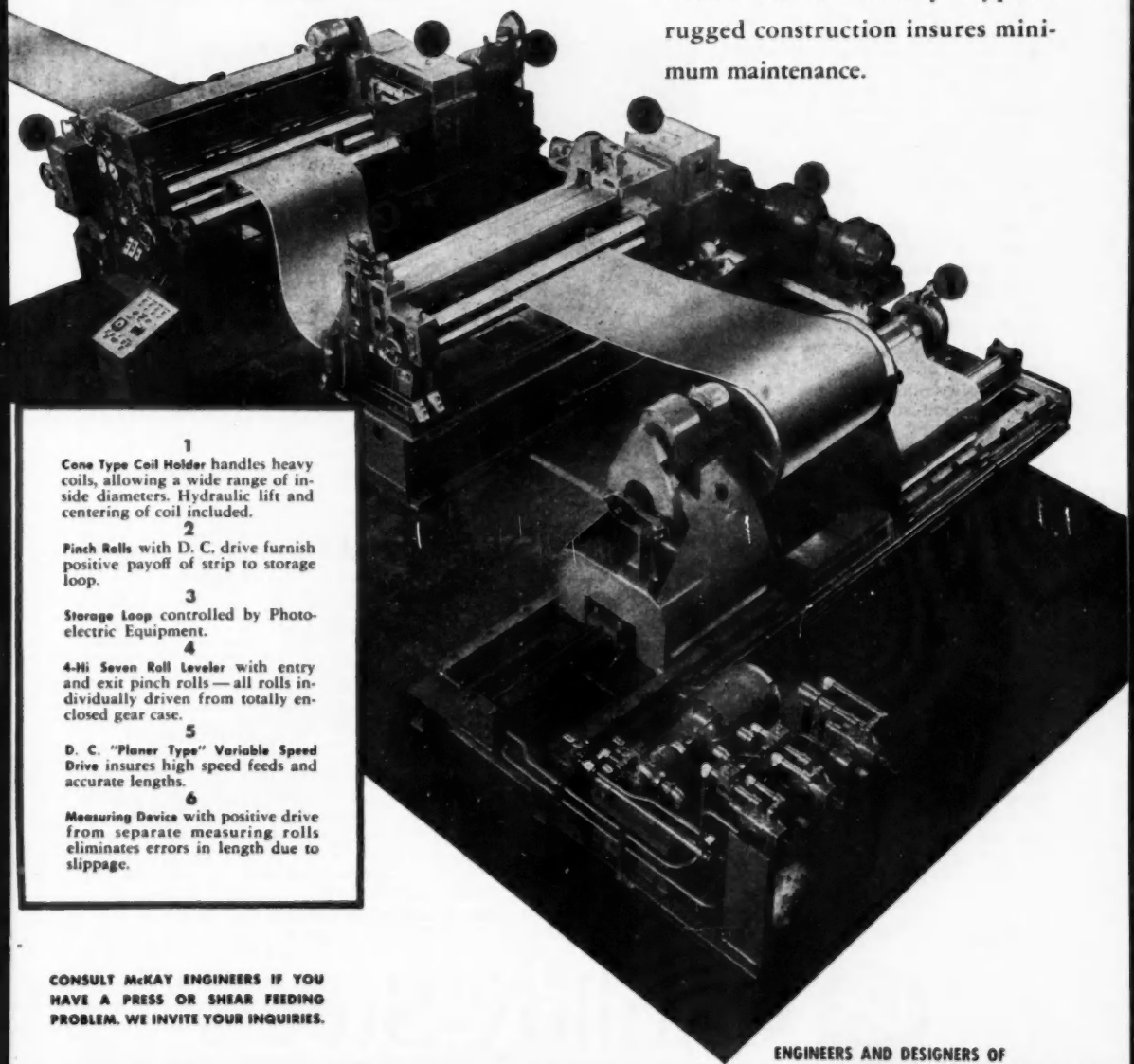
HARVEY, ILLINOIS DETROIT, MICHIGAN

McKAY

PRESS FEED AND CUT-UP LINE

A New Answer to COIL FEEDING *Problems*

Incorporating the latest in D.C. drive and control, McKay's *new* feeding line provides high production with extreme accuracy. Typical rugged construction insures minimum maintenance.



1
Cone Type Coil Holder handles heavy coils, allowing a wide range of inside diameters. Hydraulic lift and centering of coil included.

2
Pinch Rolls with D. C. drive furnish positive payoff of strip to storage loop.

3
Storage Loop controlled by Photoelectric Equipment.

4
4-Hi Seven Roll Leveler with entry and exit pinch rolls — all rolls individually driven from totally enclosed gear case.

5
D. C. "Planer Type" Variable Speed Drive insures high speed feeds and accurate lengths.

6
Measuring Device with positive drive from separate measuring rolls eliminates errors in length due to slippage.

CONSULT McKAY ENGINEERS IF YOU HAVE A PRESS OR SHEAR FEEDING PROBLEM. WE INVITE YOUR INQUIRIES.

ENGINEERS AND DESIGNERS OF EQUIPMENT FOR THE AUTOMOTIVE, FABRICATING AND STEEL INDUSTRIES

The **McKAY MACHINE** *Company*

YOUNGSTOWN, OHIO

Heavy-duty axles and shafts made without heat treating—with pre-hardened *free-cutting* CARILLOY FC

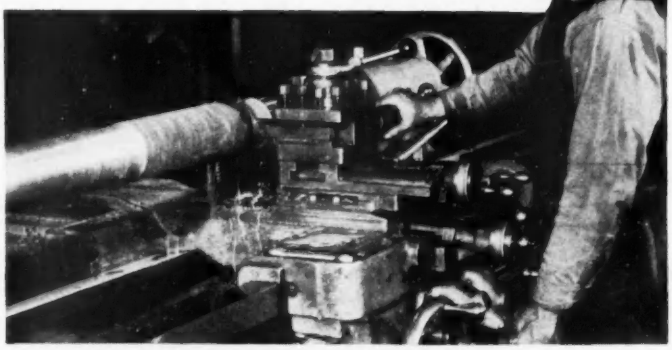
● Every year, over 5 million tons of coal pour out of the 6 Fairmont, West Virginia region mines of Consolidation Coal Company (W. Va.). All repair and rebuilding of the hard-working equipment used in these mines are done at the company's Monongah, W. Va., maintenance shop.

Here, highly skilled machinists make everything from mine locomotive axles to armature shafts. Each new part they make must be as strong as the original, without benefit of heat treatment after machining.

So here is just the place for a very special kind of alloy steel.

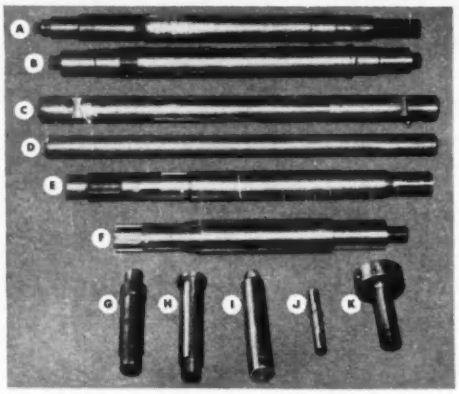
Consolidation Coal Company (W.Va.) has found that they can produce practically all of the heavily stressed parts they use in their own shops—without heat treating—with a special grade of alloy steel, such as U·S·S CARILLOY FC steel. This pre-hardened, free-cutting alloy steel is received from the mill already quenched and tempered to the hardness required. No further heat treatment is necessary. Finished parts have a minimum tensile strength of 140,000 psi. and good surface finish.

U·S·S CARILLOY FC offers you important advantages if you have to make heavy-duty shafting or other parts that require 125,000 to 175,000 psi. steel. This deep-hardening manganese, chromium, molybdenum alloy steel is available quenched and tempered from 255 to 375 Brinell. You don't have the expense of heat treating after machining and you eliminate rejects caused by distortion and scaling.



HERE, in the Monongah, W. Va., maintenance shop of Consolidation Coal Company (W. Va.), a machinist turns a CARILLOY FC axle for a 20-ton locomotive.

• • •



CARILLOY FC is used in machining this great variety of parts. Notice the diversity of applications handled by one grade of alloy steel: (A) is an armature shaft. The following parts are for loading machine: (B) loading clutch shaft, (C) conveyor take-up shaft, (D) conveyor hinge pin, (E) transmission clutch shaft, (F) caterpillar drive axle, (G) caterpillar idler axle, (H) sprocket shaft, (I) caterpillar take-up shaft, (J) hydraulic pump shaft, (K) caterpillar take-up screw.

For *production* work, remember that CARILLOY FC, easy to machine, is easy on your tools—some users report that tools last 300% longer, and more pieces can be produced per hour.

CARILLOY FC is available now, quenched and tempered *or* annealed, in all standard bar forms and sizes.

It costs only a fraction of a cent more per pound than ordinary through-hardening alloy steels.

UNITED STATES STEEL COMPANY, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

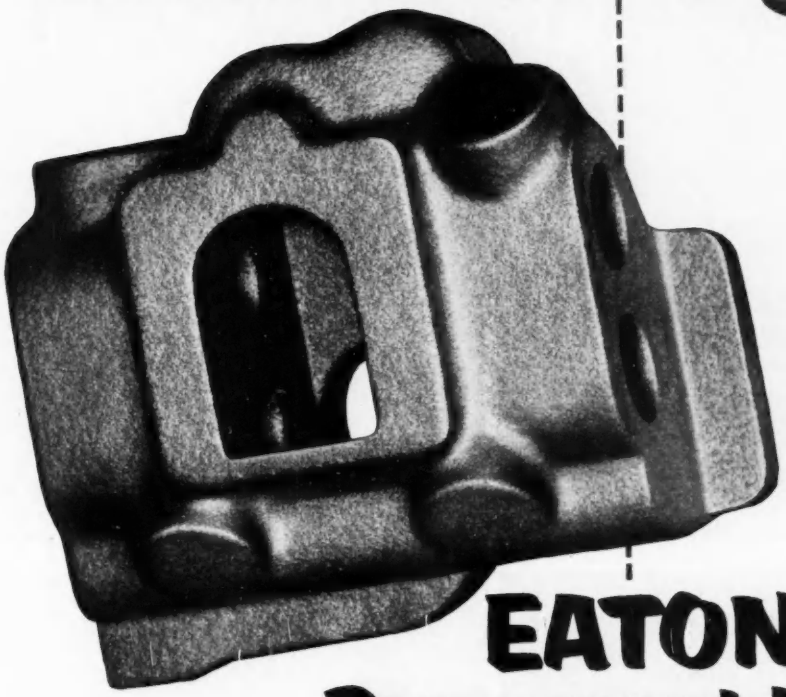
USS Carilloy Steels

2-913

ELECTRIC FURNACE OR OPEN HEARTH — COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

UNITED STATES STEEL

For better Power Steering



EATON Permanent Mold Gray Iron Castings

Send for your copy of the illustrated booklet, "A Picture Tour of the Eaton Permanent Mold Foundry."

Free machinability
Dense, non-porous structure
Uniform structure throughout the casting
Freedom from leakage under pressure
Machines to high, mirror-like finish
Properly annealed; no growth or distortion after machining

EATON MANUFACTURING COMPANY
CLEVELAND, OHIO
FOUNDRY DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Working with *White* since 1932

White engineers its trucks to *anticipate* changing transportation needs and operating conditions . . . insists that each component part measure up to White's strict standards.

Since 1932, BCA Bearings have been original equipment on White trucks. For two decades, BCA engineering has contributed to White's reputation for top performance and economy in city pick up and delivery service . . . in cross-country hauls.

Whatever *your* bearings requirements, specify the best—BCA Bearings. They are *performance* proved.

BEARINGS COMPANY OF AMERICA

LANCASTER • PENNSYLVANIA

BCA

Radial, Angular-Contact, Thrust BALL BEARINGS

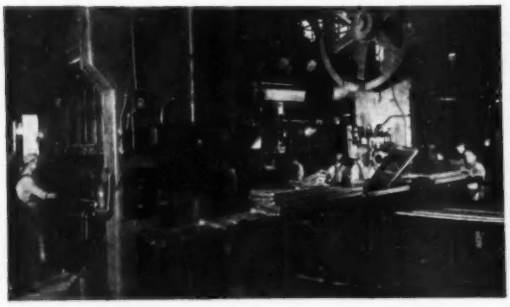
REDUCED HANDLING MEANS FASTER PRODUCTION AND LOWER COSTS AT Firestone

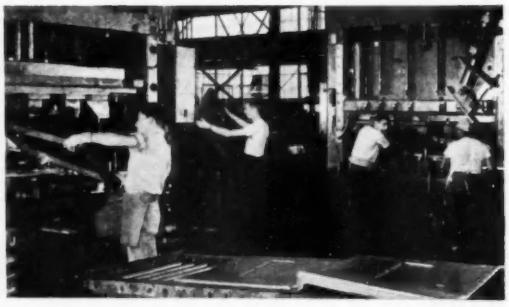
In setting up a Metal Stampings contract, Firestone thoroughly analyzes the manufacturing procedure to reduce every controllable cost factor to its minimum. This includes, of course, the coordination and integration of large multi-operation presses and their faster production methods with heat treating, welding, bonderizing, assembly and finishing.

For complete cost analysis on Stainless Steel, Carbon Steel and Aluminum Stampings and Sub-Assemblies, wire or phone Firestone Steel Products, Metal Stampings Division, Akron 1, Ohio.

HUGE, HEAVY TONNAGE, LARGE-BED-AREA PRESSES SPEED DRAWING AND FORMING

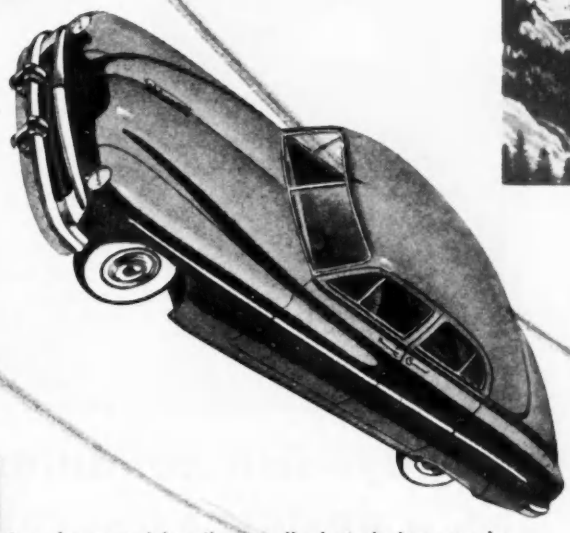
These operations are integrated with Welding, Heat Treating, Bonderizing, Painting and Assembly in Fast, Straight-Line Production.





Multi-Operation Presses are set up to save time by providing continuous flow of material under constant inspection.

FIRST 10 CARS in Mobilgas Economy Run equipped with B-W OVERDRIVE!



Figured on a straight *miles-per-gallon basis*, the best records in the 1415-mile Mobilgas Economy Run for 1952 were made by 10 stock automobiles equipped with *B-W Overdrive*. On a *ton-mile* basis, the grand sweepstakes winner every year from the start of this annual contest supervised by the *AAA* has been equipped with this famous B-W transmission unit. Offered on many leading makes of cars, B-W Overdrive cuts engine revolutions 30% . . . gives up to 3 miles "free" in every 10.

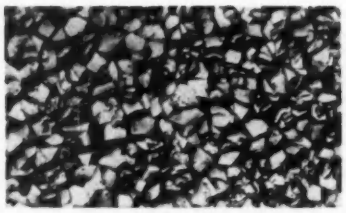
Made by B-W's Warner Gear Division, B-W Overdrive is an outstanding example of Borg-Warner's "design it better, make it better" policy . . . typical of the advanced engineering and precision production with which Borg-Warner serves the automotive industry.

B-W engineering makes it work
B-W production makes it available

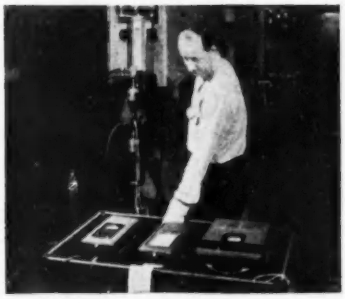
Almost every American benefits every day from the 185 products made by BORG-WARNER

ENGINEERING B-W PRODUCTION

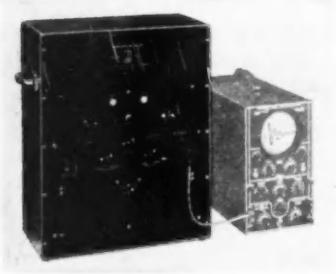
THESE UNITS FORM BORG-WARNER, ***Executive Offices, Chicago:*** BORG & BECK • BORG-WARNER INTERNATIONAL • BORG-WARNER SERVICE PARTS • CALUMET STEEL • DETROIT GEAR • DETROIT VAPOR STOVE • FRANKLIN STEEL • INGERSOLL PRODUCTS • INGERSOLL STEEL • LONG MANUFACTURING • LONG MANUFACTURING CO., LTD. • MARBON • MARVEL-SCHEBLER PRODUCTS • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN CO., LTD. • NORGE • NORGE-HEAT • PESCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WARNER GEAR CO., LTD.



SHOWS SURFACE DETAILS. This Faxfilm® projection of a cylinder bore treated with Lubrite shows crystal size and coverage. Test requires only one minute to make. Special transparent plastic film is pressed against test surface, removed and mounted, then placed in special Faxfilm Projector for magnification of 30 or 100 times. Shows roughness, wear, grain, texture, and finish in minute detail.



CHECKS WELDING TIMING. This Brush Analyzer consisting of a-c amplifier, d-c amplifier and direct-writing oscillograph is used by Taylor-Winfield Corporation to check the current and timing calibration of each spot welder before shipment. By observing wave shapes the inspectors calibrate controls quickly and accurately.



"PLAYS BACK" TRANSIENTS. The Brush Transient Recorder is designed to record and graphically show transient phenomena of ⅛ second or less. This instrument records transients on tape, then reproduces them for visual analysis by an oscilloscope. Signals can be shown complete, or expanded on the screen to show detail. Electrical transients, such as brief spot welder current surges, or other transients which can be converted into electrical impulses can be studied.

For catalog describing these Brush instruments, write The Brush Development Company, Dept. P-30, 3405 Perkins Avenue, Cleveland 14, Ohio.

study dynamic conditions with a BRUSH ANALYZER!

● Testing of parts and structures in actual operation is greatly simplified with the Brush Strain Analyzer.

Here, an engineer studies operating stresses in a diesel engine. Bonded electric strain gages "pick up" the signal, which is then amplified in the Brush Universal Amplifier, and recorded by the Brush Direct-writing Oscillograph. The recorded chart, which is immediately available, eliminates hours of plotting and testing time.

With use of a resistance-sensitive pick-up, the Brush Strain Analyzer provides a complete package unit for obtaining permanent records of torque, strain, vibration, pressure, and other variables.

Use versatile Brush Recording Analyzers to help solve your problems, and save your time. Brush representatives are located throughout the U. S. In Canada: A. C. Wickman, Ltd., P. O. Box 9, Station N, Toronto.

For catalog describing Brush instruments and their applications, write The Brush Development Company, Dept. DD-30, 3405 Perkins Ave., Cleveland 14, Ohio.

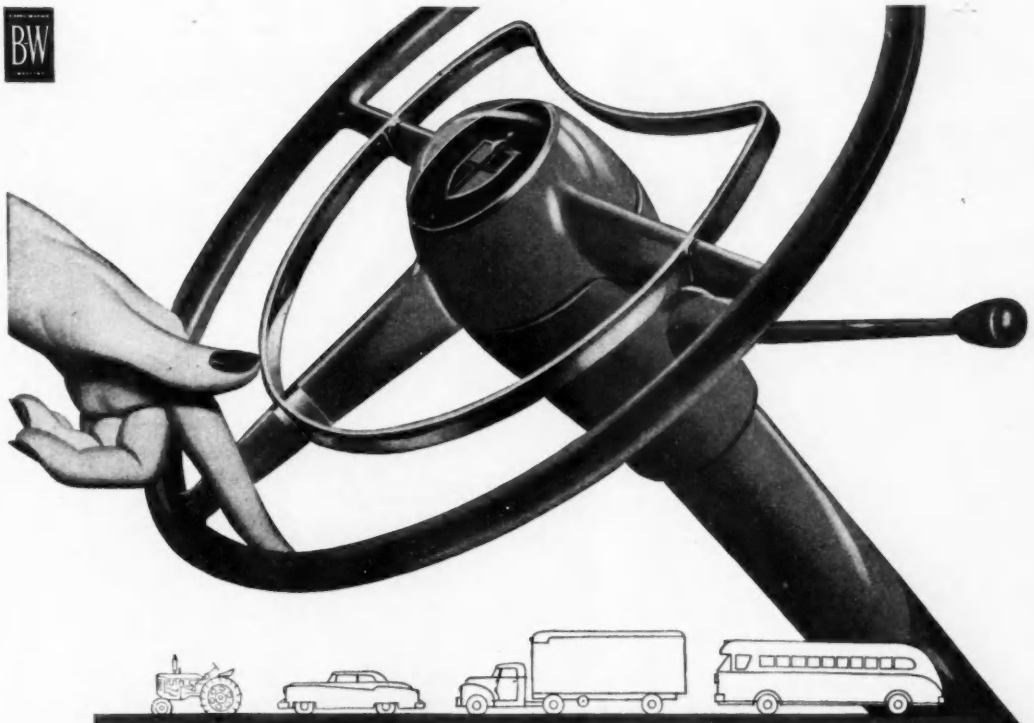
PUT IT IN WRITING WITH A BRUSH RECORDING ANALYZER..

THE Brush DEVELOPMENT COMPANY

BRUSH

Piezoelectric Crystals and Ceramics
Magnetic Recording Equipment
Acoustic Devices
Ultrasonics
Industrial & Research Instruments

BW



NOW FINGER-TIP STEERING!

. . . with PESCO HYDRAULIC PUMPS

Right now, many Americans are enjoying the thrill of hydraulic power steering for the first time. Complete and absolute control of the vehicle is obtained at all times . . . perfect safety, even on soft shoulders or in case of a blowout. Now, just the touch of a finger to the wheel, at any speed, and the vehicle responds surely and easily.

Less driver fatigue and increased pay loads for truckers are just two of the many benefits of hydraulic power steering.

Pesco engineers have worked hand in hand with automotive engineers in the development of a pump for this unit, which is one more in a long series of important developments in the field of *pressurized power and controlled flow*.

Investigate the advantages of hydraulic power steering for the vehicles you manufacture. Perhaps Pesco's experience can be helpful to you. Why not call us?

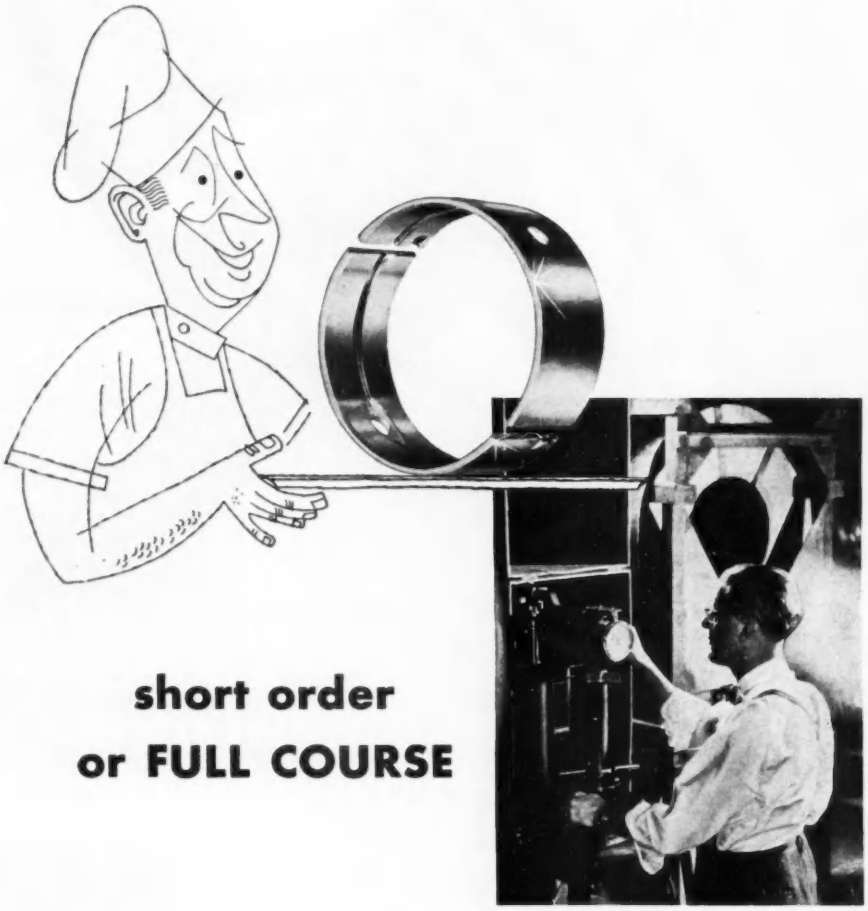
New Pesco Hydraulic Power Steering unit for passenger cars consists of pump and reservoir.

engineering Pesco production

PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD • BEDFORD, OHIO



short order or FULL COURSE

We can meet your most exacting requirements for custom quality engine bearings in small runs or mass-production quantities.

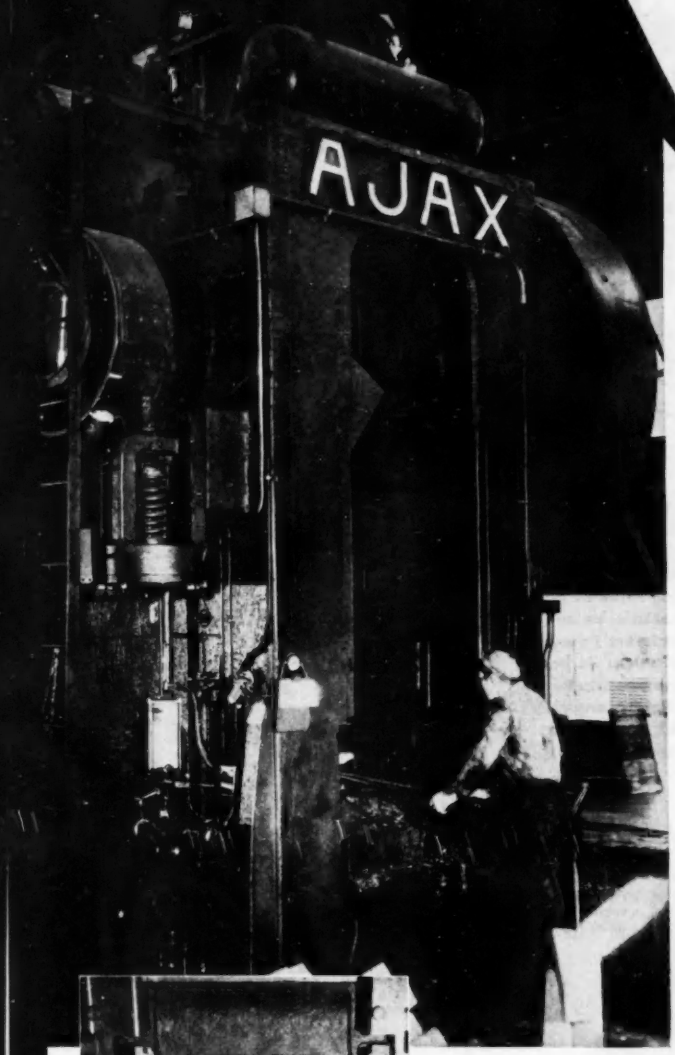
Our exacting production techniques have been developed over the years to cope with today's fluctuating demands for automotive, tractor and industrial engines.

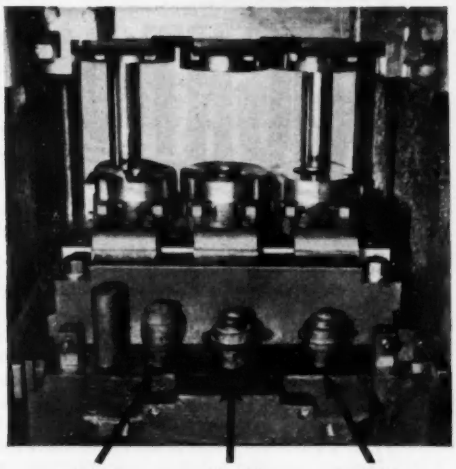
When you specify our engine bearings you gain the "know-how" of more than 25 years of precision experience in the manufacture of the finest engine bearings.

DETROIT ALUMINUM & BRASS CORPORATION

DETROIT 11, MICHIGAN

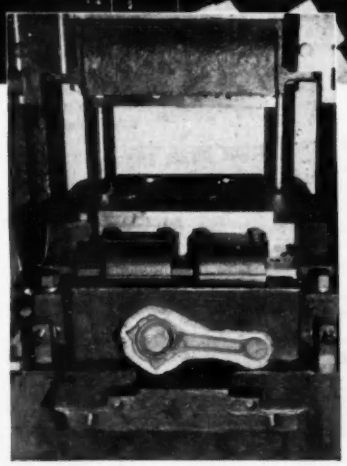
FORGED IN AJAX PRESSES





BUSTER OPERATION | FINISHED FORGING | BLOCKER OPERATION

The progressive forging operations necessary for forming gear blanks for heavy trucks are shown in the foreground. Above, the dies mounted in a 1600 ton press, are in the following order: buster die on the left, blocker die on right and the finish forge die in the center. Each operation is shown in front of the die it is formed in.



Shown here are the dies and bolsters mounted in a 1600 ton press. The product, a heavy automotive connecting rod, is pictured in the foreground.

THE Ajax MANUFACTURING COMPANY

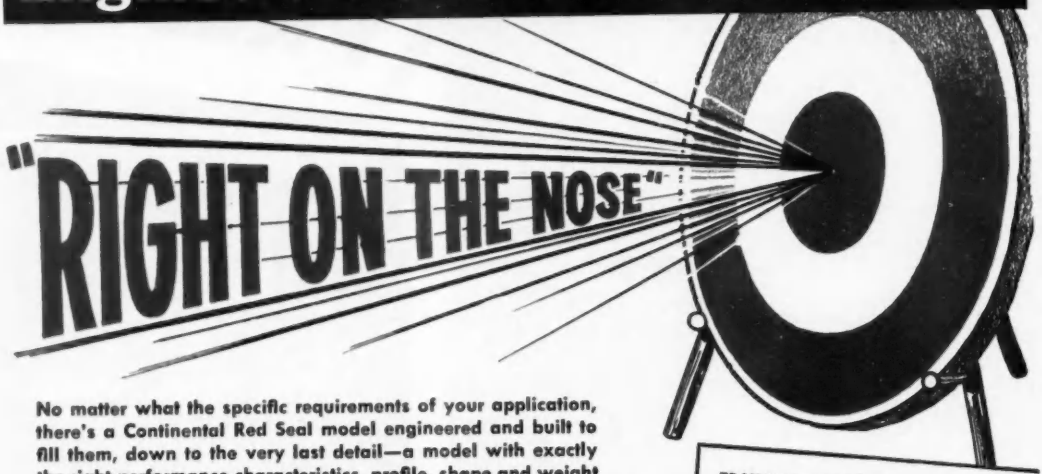
EUCLID BRANCH P. O. CLEVELAND 17, OHIO

1105 DEARBORN ST. CHICAGO 3, ILLINOIS

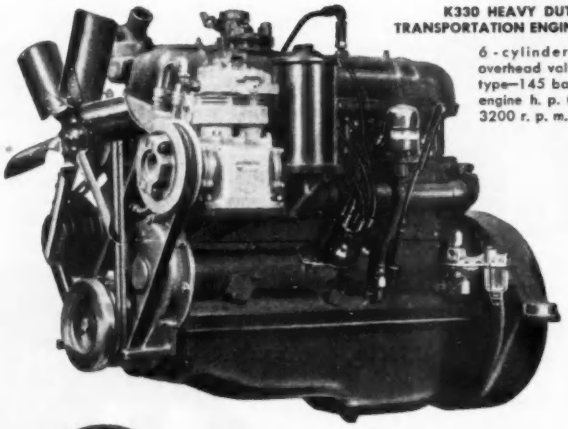
DEWART BUILDING NEW LONDON, CONN

WRITE FOR BULLETIN 75 B

There's a CONTINENTAL Model Engineered to Fit YOUR Job . . .



No matter what the specific requirements of your application, there's a Continental Red Seal model engineered and built to fill them, down to the very last detail—a model with exactly the right performance characteristics, profile, shape and weight . . . That is because Continental Motors produces some 80 basic models, to more than 2,000 different specifications, as set by vehicle, implement and equipment manufacturers' varying needs. When you buy a truck with a Red Seal under its hood, you get the fine result of 50 years' close collaboration between leading vehicle builders and Continental Motors engineers . . . Choose a truck with Continental Red Seal engine—gasoline, Diesel or L.P.G.—for the power, economy and long life that mean lowest ton mile costs.



K330 HEAVY DUTY TRANSPORTATION ENGINE

6-cylinder—overhead valve type—145 bore engine h. p. @ 3200 r. p. m.

TRANSPORTATION GASOLINE ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N4062	4	2⅛	3½	62	26.6 @ 3600 RPM
Y4069	4	2½	3½	69	28 @ 3400 RPM
Y4091	4	2⅝	3½	91	36 @ 3400 RPM
F4124	4	3	4½	124	47 @ 3200 RPM
F4140	4	3⅛	4½	140	52 @ 3200 RPM
F4162	4	3⅜	4½	162	58 @ 3200 RPM
F6186	6	3	4½	186	77 @ 3500 RPM
F6209	6	3⅛	4½	209	90 @ 3500 RPM
F6226	6	3⅛	4½	226	99 @ 3500 RPM
M6271	6	3⅜	4½	271	97 @ 3000 RPM
M6290	6	3⅜	4½	290	108 @ 3000 RPM
M6330	6	4	4½	330	125 @ 3000 RPM
B6371	6	4⅛	4½	371	123.5 @ 3000 RPM
B6427	6	4⅛	4½	427	142 @ 3000 RPM
T6371	6	4⅛	4⅝	371	144 @ 3000 RPM
T6427	6	4⅛	4⅝	427	166 @ 3000 RPM
U6501	6	4½	5⅛	501	177 @ 2600 RPM
R6513	6	4½	5⅝	513	180 @ 2800 RPM
R6572	6	4⅝	5⅝	572	200 @ 2800 RPM
R6602	6	4⅞	5⅝	602	212 @ 2800 RPM
S6749	6	5⅛	5½	749	250 @ 2800 RPM
S6820	6	5⅛	5½	820	277 @ 2800 RPM
K6271	6	3⅜	4½	271	115 @ 3200 RPM
K6290	6	3¾	4½	290	123 @ 3200 RPM
K6330	6	4	4½	330	145 @ 3200 RPM

TRANSPORTATION DIESEL ENGINES

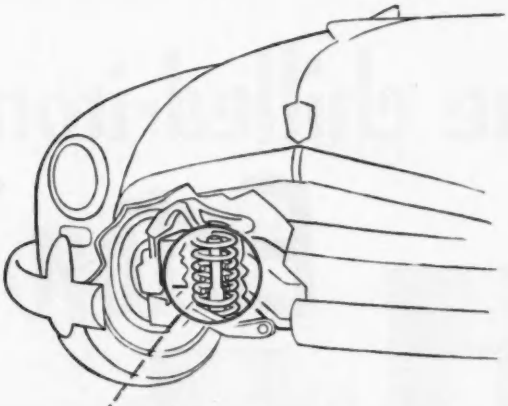
Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
TD6427	6	4⅛	4⅝	427	112 @ 2400 RPM
RD6572	6	4⅝	5⅛	572	150 @ 2200 RPM

PARTS AND SERVICE EVERYWHERE

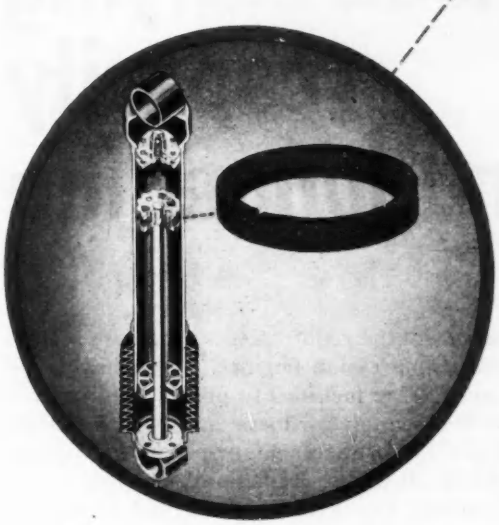
CONTINENTAL MOTORS — Powerful as the Nation's — AMERICA'S STANDARD

Continental Motors Corporation

MUSKEGON, MICHIGAN



Du Pont nylon part functions as automatic thermostat



Columbus shock-absorber piston ring molded for Heckethorn Manufacturing and Supply Company, Littleton, Colorado, by Formold Plastics, Inc., Chicago.

Nylon piston ring controls flow of fluid in new hydraulic shock absorber

When engineers set out to design this shock absorber, they were faced with the problem of regulating the proper flow of hydraulic fluid under all temperature changes. The problem was solved by installing a piston ring molded of Du Pont nylon. Called a "thermo ring," this key part actually functions as a thermostat, automatically controlling the flow of fluid at any temperature.

The nylon "thermo ring" is fitted to the assembly, which includes rebound and compression valves. These valves control flow of fluid through the piston. The "thermo ring" not only permits oil to flow both around and through the hydraulic piston—thereby providing the necessary damping action—but it also regulates this oil flow during extreme changes in temperature.

Du Pont nylon is unaffected by abrasion and organic solvents . . . as well as by the 205°F. maximum operating temperature of the shock absorber. It has the toughness to withstand the 200-lb. maximum pressure build-up of the shock. Exhaustive tests were made prior to the specification of nylon for the "thermo ring." It was found that no other material investigated had the combination of properties necessary to achieve the results obtained with molded Du Pont nylon.

Perhaps nylon's strength, resiliency and other valuable properties can help improve or develop a product for you. For further information on nylon and other Du Pont plastics, write;

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Dept., District Offices:
350 Fifth Avenue, New York 1, New York
7 S. Dearborn St., Chicago 3, Illinois
845 E. 60th St., Los Angeles 1, California

DU PONT
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BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY
Polychemicals
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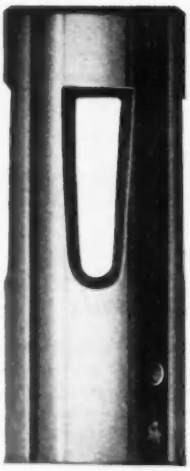
PLASTICS • CHEMICALS

the chilled-iron face gives Eaton Tappets superior load-carrying capacity and longer life



To keep pace with the requirements of today's higher-speed, higher-compression engines, Eaton has developed special foundry facilities to produce chilled-face tappets with essential hardness and wear-resistant characteristics. Eaton offers volume-produced, volume-priced, lightweight tappets capable of carrying excessively high loads. From the ladle to final inspection, the wear-resistant hardness of the face and the over-all quality of Eaton tappets are guarded by precise metallurgical control.

You can utilize Eaton's long experience in this field by giving our engineers an opportunity to work with yours in the early stages of design.

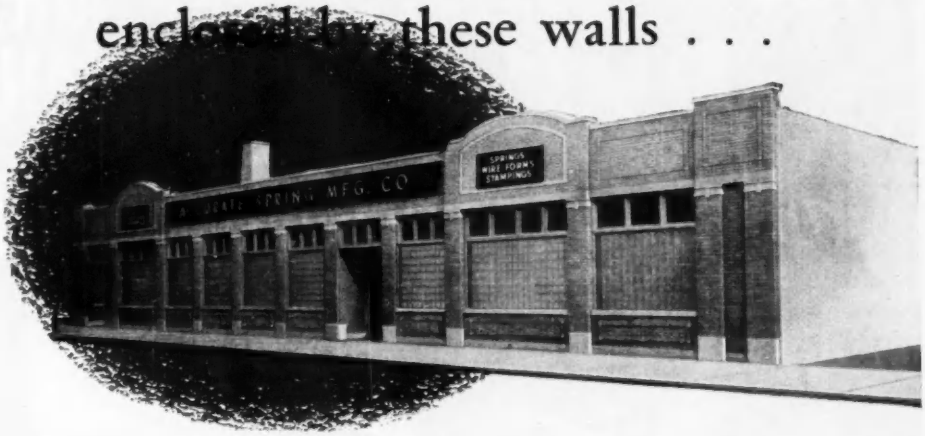
EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

SAGINAW DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

There's a lot of spring know-how enclosed by these walls . . .



and it's ready to work for you in civilian or defense production

IN the manufacture of precision springs in large quantity, the intangible ingredient "know-how" is a mighty important factor. To the purchaser, it can mean very important savings not only in first cost but in the sum of all the costs involved in getting the spring into your product and ready to function.

We have many case histories to show you how tooling and methods developed by Accurate have made it possible to slash the cost of springs to our customers — and in most cases the customer got better, more accurate springs.

We'll be happy to show you what we have done for others but, most of all, we would like to show you what we can do for you. If you require large quantities of precision springs for civilian or defense production, write today. There's no obligation.

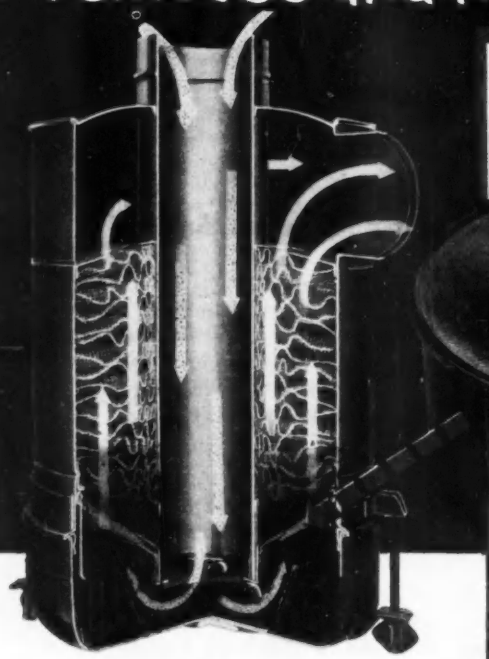
ACCURATE SPRING MFG. CO. 3810 W. Lake St., Chicago 24, Ill.

The Accurate Spring Handbook is a widely used guide for making spring calculations. You'll find it full of helpful short cuts. If you do not have a copy of this latest edition, write for yours, today.

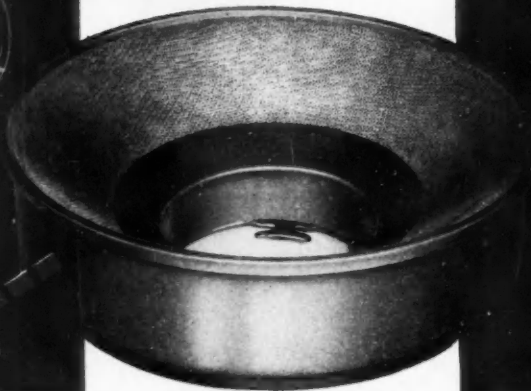
Accurate Springs

SPRINGS • WIRE FORMS • STAMPINGS

New Tray-Type AIR CLEANER removes and holds more dirt!



RECOMMENDED FOR HIGH-CAPACITY ENGINES on large tractors, rock crushers, power shovels, etc. Large dirt-holding capacity allows longer interval between servicing.



REMOVABLE TRAY SIMPLIFIES SERVICING Entire tray is quickly removed for cleaning. Multiple screens prevent clogging of condensing element.

IN THIS NEW Donaldson heavy-duty cleaner, the removable multi-screen "tray" and revised oil cup design feed more of the condensed oil back into the air stream adjacent to the center tube.

A balanced distribution of oil across the entire lower element has been achieved, eliminating both overloaded and "thin" areas.

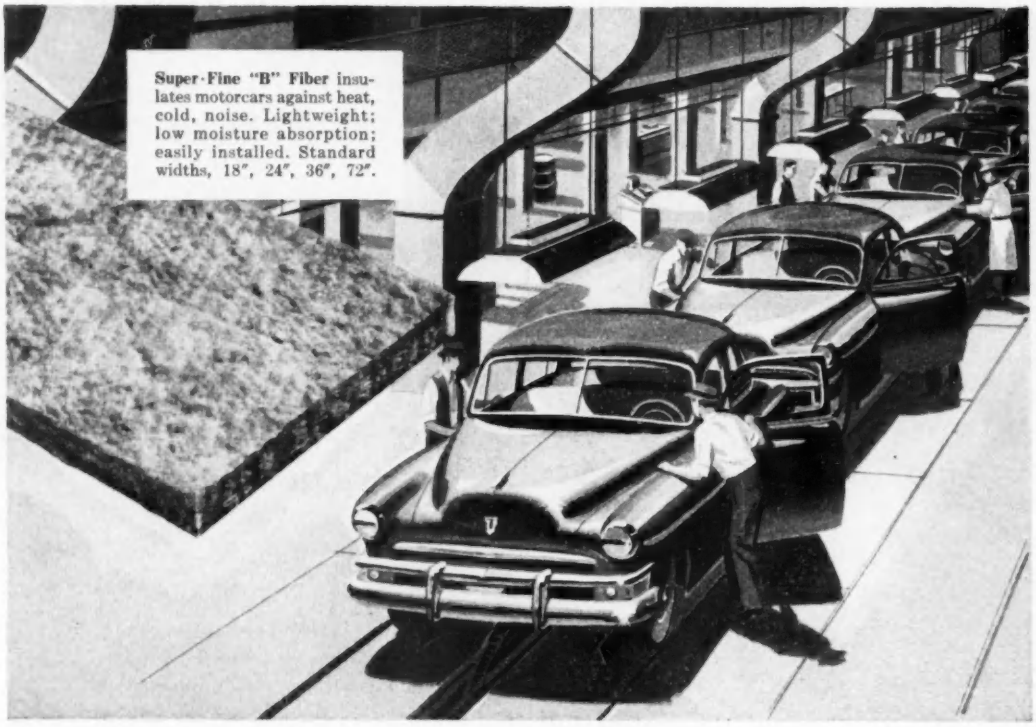
Extensive tests in the field over a period of five years prove conclusively that the new cleaner has a higher cleaning efficiency and a greater dirt-holding capacity. We invite manufacturers to write or call for design data and test reports.

DONALDSON COMPANY, INC.

666 Pelham Blvd. • St. Paul 4, Minnesota

Donaldson Co. Ltd. (Canada), Chatham, Ontario

Donaldson AIR CLEANERS



On your production line... On Schedule

L·O·F Fiber·Glass—like safety glass—
delivered when you want it

AS A MAJOR supplier to the automotive industry, Libbey·Owens·Ford knows the importance of always meeting your schedules. Now, we are applying this knowledge of your production problems to supplying L·O·F Fiber·Glass insulation *right on time.*

L·O·F Super·Fine Fiber·Glass is ideally suited for insulating the top, dash, front quarters, fire wall, hood, and package tray against sound, heat. And you can count on Libbey·Owens·Ford's insistence on high standards to produce top-quality insulation.

For a reliable answer to your insulating needs, look to Libbey·Owens·Ford to supply you with Fiber·Glass promptly and to your specifications.

If you'd like to talk about uses of Fiber·Glass in the automotive field, call L·O·F's Detroit office, 610 Fisher Building, Trinity 5-0080. Or write, wire or phone Libbey·Owens·Ford, Dept. F·G 752, Nicholas Building, Toledo 3, Ohio.

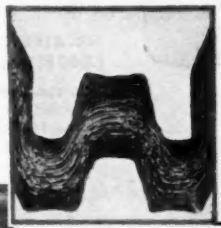
L·O·F FIBER·GLASS

LIBBEY·OWENS·FORD GLASS COMPANY
FIBER·GLASS DIVISION

FIBER·GLASS

Forging is older than civilization

One of the outstanding characteristics of forged metal parts, as contrasted with metal parts formed by other methods—casting, pressing, welding, etc.—is the movement of the fibres of the metal in following the contours of the part. This is known as "grain flow" and results in placing strength where it is required. The photograph to the right is part of a section of an automobile crankshaft forging etched to show the grain flow, particularly at the "cheeks", which are the load bearing surfaces. →



Archeologists agree that while true man has been on the earth for from 40,000 to 50,000 years, the age of culture can be dated not earlier than Neolithic man or some 12,000 years ago. And perhaps no longer ago than 6,000 B.C. did civilization which is a combination of the fundamental techniques of domestication of animals, agriculture, horticulture, pottery, brick-making, spinning, weaving and metallurgy, come into existence. Yet the hammer, the first of man's implements (the knife was the second) goes back beyond the age of true man to Neanderthal man who roamed the earth 100,000 years ago.

NO other form of metal working is so ancient, yet so modern as forging. The strength and toughness imparted to hot metal by impact is more essential today than at any previous time in man's history. Unbelievable speeds, terrific stresses and strains, split second changes in temperatures . . . all these make forgings imperative.

Chambersburg hammers have been meeting the constantly more rigorous demands of industry for stronger forgings, tougher forgings, more accurate forgings, in greater quantities, in shorter time . . . for over half-a-century.

CHAMBERSBURG ENGINEERING CO., Chambersburg, Pa.

CHAMBERSBURG

THE HAMMER BUILDERS

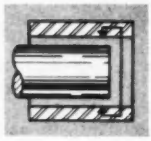
Only DIMENSIONAIR Gives You All This

FULL 7½" SCALE OF CALIBRATED ACCURACY

All of it measures accurately. Not just part of it!

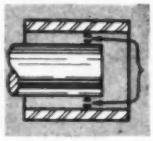
LONGER APPROACH RANGE

You measure earlier BEFORE reaching minimum work size. Less scrap. Same plug used on both rough and finished dimension. Total minus range .0015".



GREATER CLEARANCE (.0018" up to .0038")

You can read Undersize, Taper, Out-of-Round and Irregular Shape Holes without plug getting stuck. Easier to insert plug.

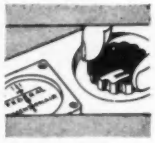


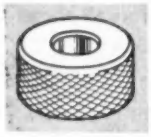
STAY-PUT ZERO — DON'T WORRY ABOUT PRESSURE FLUCTUATIONS

They do not affect accuracy. Set zero when you start—that's all. No drifting. Full Jeweled Cushioned Movement — more sensitive to size variations.

10 SECOND SET-UP — JUST ONE ADJUSTMENT

As simple as setting a Dial Indicator. Direct and Positive.





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Only air gage with enough precision to permit use of only one master. Interchangeable plugs — every plug calibrates on same scale.

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Saves you real money.

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Only the Dimensionair provides the many important features above. Customers who have given the Dimensionair a thorough trial have found its advantages outstanding and have ordered many Dimensionairs in large quantities, and repeatedly. We invite you to try the Federal Dimensionair and compare it with any other air gage. Ask our nearest representative or write today for complete information and prices. FEDERAL PRODUCTS CORPORATION, 1265 Eddy Street, Providence 1, R. I.

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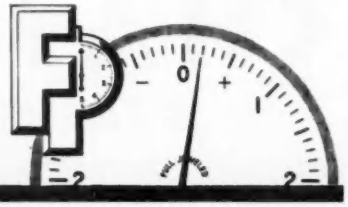

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how they save time, money, lives!

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. . . and it's YOURS for the Asking!

Here's an extremely interesting, enlightening, and easy-to-understand book! It tells the dramatic story of Magnaflux inspection methods—how, even now, these miracles of modern science are working night and day to make good products better. How they save money and increase production,—improve maintenance,—and safeguard life and property!

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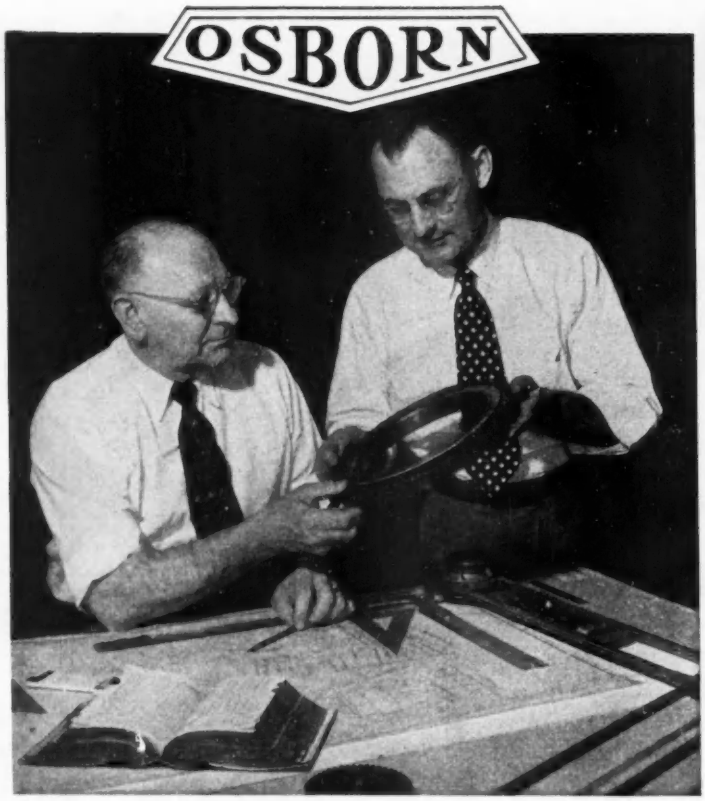


Board of strategy for your "Operation Push Button"

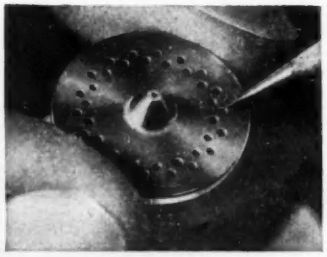
Your need for mechanization today finds a powerful ally in the machine design talents of Osborn.

When your **O**sborn **B**rushing **A**nalyst recommends the latest in "push button" brushing methods to solve your cleaning and finishing problems he is backed by experienced engineers and craftsmen—research men, designers and production men who serve you these ways: (1) They develop basic brushing methods to solve your problem. (2) They help your engineers or your machine builder to design the right brushing machine for you. (3) If desirable, they even design the brushing machine for you and supervise its construction. The proper approach depends on *your* needs. The main thing is:

You *know* your brushing problems are in good hands when you call in your **OBA.** This thorough service is yours for the asking. Call today or write *The Osborn Manufacturing Company, Dept. 714, 5401 Hamilton Ave., Cleveland 14, Ohio.*

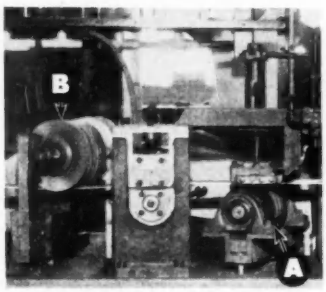
Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



TINY BUT TOUGH. Drilling of this nickel-size stainless steel part of an aircraft engine left burrs around the edges which were difficult to remove. The **O**sborn **B**rushing **A**nalyst helped solve the problem by using Osborn brass wire brushes and an abrasive compound with the right amount of grit. Now burrs come off clean and sharp corners of holes are well rounded . . . *at the push of a button.*

TRY MASTER® STRIP. This Osborn Brush is available in forms, shapes, sizes and fill material to match your job of cleaning, scrubbing or finishing . . . to boost your output and cut your costs . . . *at the push of a button.*



IT'S AUTOMATIC. This machine, developed with the help of the **O**sborn **B**rushing **A**nalyst, cleans steel-backed, babbitt-lined strip for production of automotive sleeve bearings. With the strip traveling continuously, Osborn Master® Wheel Brushes (A) remove all dirt, rust and metal particles from the steel surface. Osborn Monarch® Sections (B) then thoroughly clean the babbitt side. Perhaps a similar brushing method can help improve *your* production . . . *at the push of a button.*

Oil seals installed to permit periodic flushing of bearings in large hoist drum assembly

A simple and practical solution to an unusual combination of sealing problems is found in the hoist drum assembly of the Marion Type 93-M Power Shovel.

Design of the hoist drum assembly requires oil sealing to retain lubricant around four widely separated main bearings. However, the sealing must be such as to easily permit periodic flushing of the entire housing area by grease under pressure.

Other design features also affect the sealing problem. Shaft diameters are large—approximately 10". The shafts are reversible; they operate at variable speeds, and there are many abrupt starts and stops. There are the run-out inducing tendencies of hoist pulls exceeding 32.5 tons. Frequently, there are severe external dust conditions.

An effective and economic solution of the problem is the use of two pairs of National 50,000 series seals. These are steel-encased, spring-loaded units with leather sealing members.

The outer pair of the large, heavy-duty seals is installed at (A) in the assembly. Sealing members face inward to retain lubricant around the bearings and prevent leakage onto the drum brake assembly. These sealing members also exclude dust and other foreign abrasives from the bearings and housing.

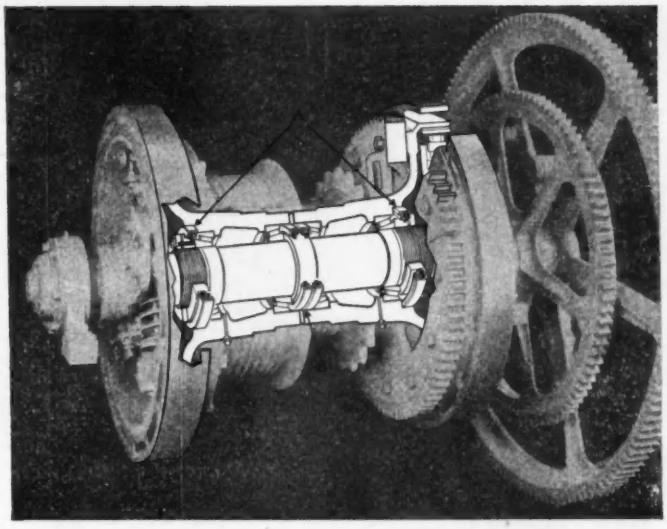


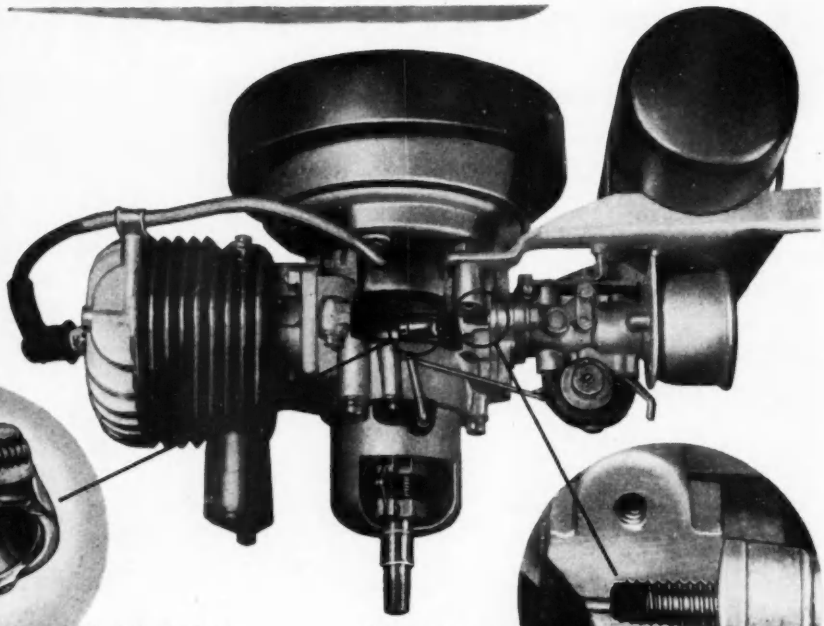
Fig. 1—Hoist drum assembly

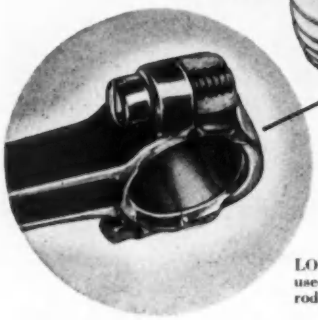
Fig. 2—National 50,000 series seal

At (B), an identical pair of National 50,000 series seals are installed with sealing lips facing outward. Correct loading of the tension springs insures retention of lubricant during operation, permits lubricant flushing at a controlled point during periodic greasing operations, and excludes dust, mud, etc.

National Oil Seals used in the Marion 93-M assembly are standard designs, as are other National seals used elsewhere in this equipment. In many cases, widely varied sealing problems can be solved quickly and economically through use of standard designs. In other cases, special designs and tools are needed. In either event, National Oil Seal engineers can call on 25 years of sealing experience to help you. For complete information, write or call the nearest National office.

LOK-THRED
can't shake loose





LOK-THRED bolt used on connecting rod assembly.

LOK-THRED studs used to join frames at vibration points.

Engine builder anchors critical vibration points with LOK-THRED

By utilizing LOK-THRED'S extra strength and more positive locking action, manufacturers are finding *better* answers to many vibration-fastening problems.

For example, in this lightweight, air-cooled gasoline engine, manufactured by Power Products Corp., the cylinder and carburetor assemblies are held in place by LOK-THRED studs, anchored as shown in the cutaway view at right. Subject to vibration through the life of the engine, these studs provide extra strength in both tension and torsion . . . actually *become tighter in service.*

LOK-THRED bolts are used to provide positive locking on the connecting-rod assembly.

LOK-THRED may provide the better fastening method you've been looking for. Write today for LOK-THRED booklet, giving full information and technical details.

Motor with cut-out sections illustrating LOK-THRED applications, courtesy Power Products Corp., Grafton, Wisc.

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UNBRAKO SHOULDER SCREWS

uniform, standardized, precision threaded industrial fasteners . . .

HAVE NUMEROUS APPLICATIONS

You can use these UNBRAKO Socket Head Shoulder Screws as stationary shafts or pivots, moving shafts or pivots, stationary guides, and for stripper plate and pressure pad applications. These UNBRAKO screws have shoulders held to close tolerances, finished threads close to the shoulder, and threads and heads concentric with the body. Write for descriptive literature. STANDARD PRESSED STEEL Co., Jenkintown 53, Pennsylvania.

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SPS
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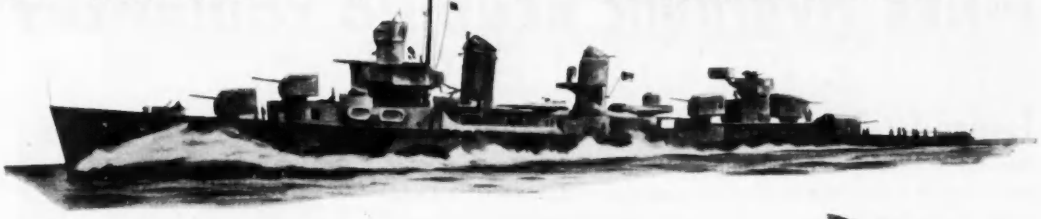
CAP SCREWS • SET SCREWS • SHOULDER SCREWS • DOWEL PINS • PRESSURE PLUGS

Whether it's a DESTROYER

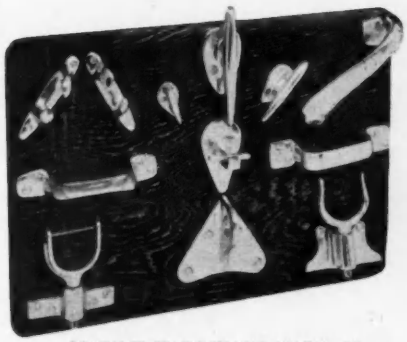


. . . or a DINGY

FRONTIER 40-E

ALUMINUM ALLOY

HELPS GIVE THEM Seagoing Strength

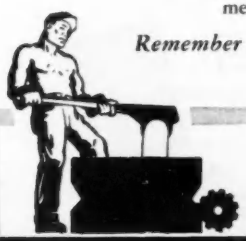


MARINE HARDWARE MADE OF FRONTIER 40-E ALUMINUM ALLOY
Courtesy Aluminum Marine Hardware Co., Inc., Auburn, N. Y.

Whether it's used on land, sea, or air . . . whether it's used in radar equipment, oar locks or deck cleats . . . on trucks, "jets", or ships, FRONTIER 40-E Aluminum Alloy castings have the essential properties to do a better job. Here's an alloy that has machineability, shock and corrosion resistance, pressure tightness, high yield strength and extremely light weight all rolled into one rugged alloy. It needs *no heat treatment* and is as ideal for precision parts as it is for heavy-duty truck axles . . . Find out how many different jobs FRONTIER 40-E is ready to do for *you*.

Write today for FREE ALLOY DATA book full of engineering and metallurgical facts that will be of value in your casting jobs.

Remember . . . if aluminum can do it better . . . FRONTIER 40-E *Aluminum Alloy can do it best!*

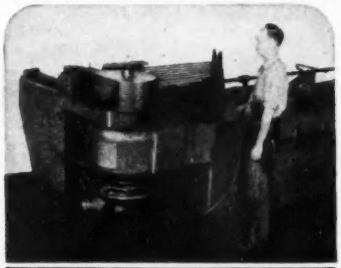


FRONTIER BRONZE CORPORATION
4885 PACKARD ROAD, NIAGARA FALLS, NEW YORK

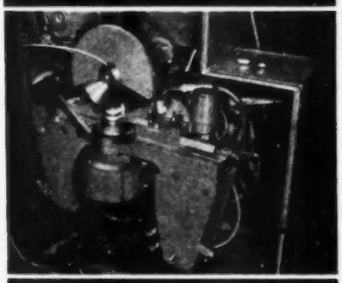
PRODUCTION Short-Cuts with PINES Hydraulic BENDING EQUIPMENT

Tooling Set-Ups Engineered To Meet Your Needs

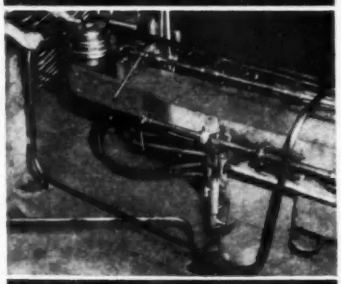
Here are five examples of bending applications illustrating how Pines machines are successfully employed to save time and cut costs on a wide range of bending work. As shown, different tooling setups are engineered and easily applied to handle a variety of production requirements. Hydraulic power, which is used on all Pines Benders, assures accurate, uniform production results and safe, dependable performance. Push-button controls and automatic operation assure high efficiency and production economy. There's a complete range of Pines Benders designed to handle light or extra heavy work, small lot, or high production runs. Call on Pines engineers when you need help with a bending problem. There is no obligation. Phone Aurora 2-7608.



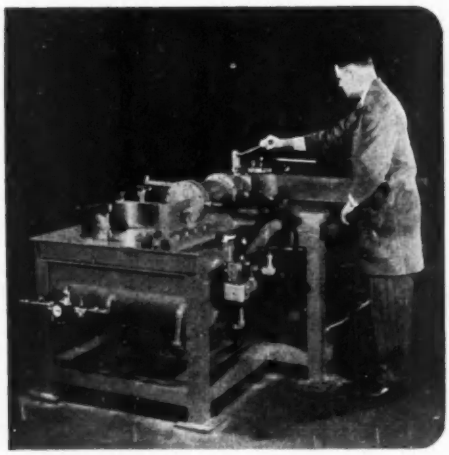
1. MULTIPLE GROOVE DIE — on Pines Size 3 Automatic Bending Machine forms ten 7/16" x 67-1/2" steel rods simultaneously to a 22" radius for farm implements.



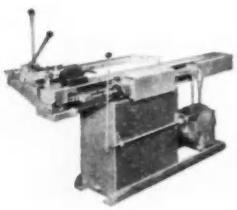
2. DOUBLE DIE AND CUT-OFF SETUP — on Pines Size 3/4 Automatic Bender. Produces 3/4" copper return bends to 7/8" c/l radii automatically, two pieces at a time.



3. TRIPLE RADIUS SETUP — on Pines Size 3/4 Automatic Bender handles three different radii and six 90-degree bends in 1-1/8" tubing in fast sequence. Increases truck seat frame output with less handling.



4. FORMING BLOWER HOUSINGS ON PINES ROTARY BENDER — bends irregular curve (radii of 5-17/32" to 7-3/4") in 5-1/2" width stock at a speed of 89 pieces per hour. Floating bronze pad acts as a wiper shoe, maintains uniform pressure, assures smooth, wrinkle-free results.



5. PINES SEMI-AUTOMATIC BENDER — tooled for production-line bending of extruded aluminum automotive moldings. Simple setups and easy manual toggle clamping also provides unusual economy for variable short-run and maintenance work not adaptable to fully automatic equipment. Hydraulic power assures uniform results, safe operation.

***Write* TODAY FOR FREE LITERATURE**

Write for free literature describing and illustrating various Pines Benders, attachments, and methods on actual jobs. Find out how Pines Benders are designed to save time and cut costs on a wide range of work.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

BENDING • DEBURRING • CHAMFERING • THREADING MACHINERY

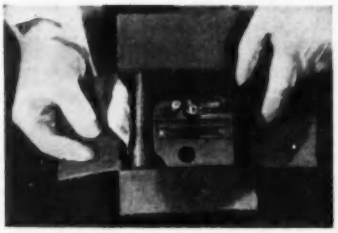
653 WALNUT • AURORA, ILLINOIS

JAN-P-116, Packaging and Packing for Overseas Shipment. Preservation, Methods of, May 8, 1945, and Amendment #2, Dec. 14, 1948, Method IIb "Container-Barrier-Container"

READ AND SAVE THIS ISSUE FOR FUTURE REFERENCE

MILITARY PACKAGING SIMPLIFIED #3 of a series

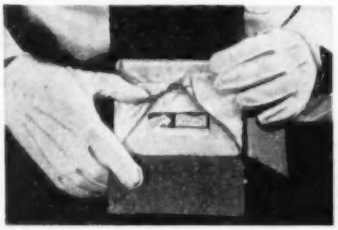
The standard method of packaging and packing of electrical equipment and spare parts (electronic, electrical and electro-mechanical) shall be as described in JAN-P-658 and as amplified by joint Army-Navy specification JAN-P-116.



1. Small electric motor (not over 40#), properly cushioned, placed in a close-fitting carton with proper amount of desiccant. Note that desiccant should not be placed next to an untreated surface, as corrosion will occur. Carton should not be tightly taped; merely enough for physical strength.

2. Carton is immediately inserted in moderately snug-fitting bag constructed from MIL-B-131A, Class B material: Reynolds RM-112 if object weighs 30# to 40#; RM-102 if object weighs 5# to 30#; and RM-245 if less than 5#. Bag should be large enough to permit three additional heat seals at open end for inspection.

3. Bag is then heat-sealed immediately, first exhausting as much air as possible without stretching the material too tightly over corners of package. Care must be exercised in heat-sealing to be sure temperature, pressure and dwell time meet the recommendations of the barrier material manufacturer.



4. After barrier bag has been properly exhausted and sealed it should be identified as to contents. The protruding "ears" of the bag are then folded down and the entire unit is ready for insertion in the outer container which can be of fibre or wood. The bag should also carry a label reading "Method II Pack. Do not open."

5. The completed package ready for shipment. Note that the identification label and the Method II warning label are also required on the outer container. In many instances the outer container will be of wood construction; if so, it must be lined with kraft paper, or fibre board, to protect the barrier from puncture.

Method IIe—"Container Overwrap." This method uses the same materials (MIL-B-131A, Class B) as Method IIb pictured here, except the outer individual container is omitted and several units of barrier bags are overpacked in one wooden container.

REYNOLDS ALUMINUM LAMINATED BARRIERS ARE SUPERIOR FOR METHOD II PACKAGING

1. **Excellent moisture-vapor protection**
2. **Extremely rugged under all climatic conditions**
3. **Offers super-strength heat seal closure**

SEE REYNOLDS TRAVELING DEMONSTRATION OF MILITARY PACKAGING!

Government-specified methods of foil and laminated-foil packaging demonstrated with actual military products and parts. *Write for Coach Itinerary!* For expert help on any packaging problem, call the nearest Reynolds Sales Office and ask for the "Packaging Man." Or write direct to Reynolds Metals Company, General Sales Office, Louisville 1, Kentucky.

REYNOLDS ALUMINUM

Tune in every Week . . . "The Kate Smith Evening Hour" on Television—NBC NETWORK

ROCKFORD ECONOMY LATHES

give you both **ACCURACY AND PRODUCTION**

● Rockford Lathes are furnished with 2, 3, *or* 5 H.P. motors to give you power and speeds for heavy cuts or use of carbide tools.

A quick-change gear box provides carriage feeds from .004″ to .060″ and full range of threads from 4 to 56. Twelve spindle speeds are easily selected through convenient shift levers.

Tool room accuracy is a natural with the big, precision Timken Bearing Spindle. Heavily constructed tail stock is equipped with antifriction thrust bearings for ease of operation. Precision hobbed and shaved gears are provided in the headstock.

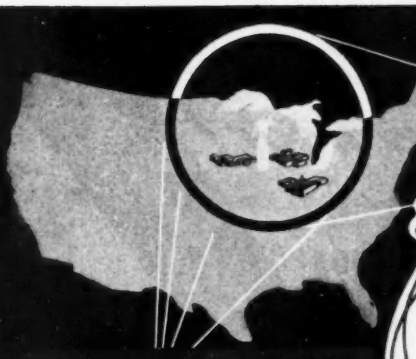
When you're buying Lathes, look for the *most* lathe, to give you *more* work. Ask a Rockford representative to give you the complete story on the *accuracy, production and economy* of Rockford Lathes.

MEDIUM-SIZED ECONOMY-PRICED

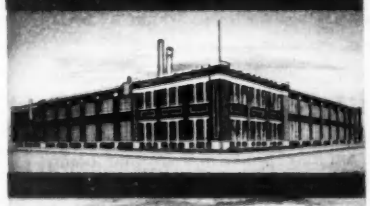
ROCKFORD ECONOMY LATHES — 16" and 18"

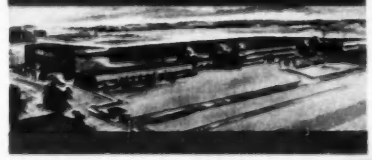
522

ROCKFORD MACHINE TOOL CO. • ROCKFORD, ILLINOIS



The Automotive World Knows MOTOR PRODUCTS





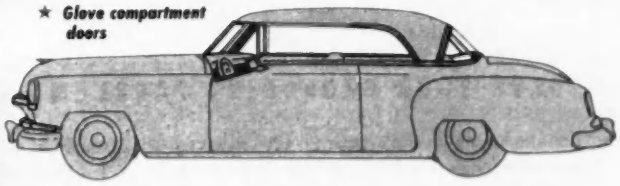
Yes . . . 35 years of metal finishing experience has built a reputation for Motor Products which is recognized by the entire automotive world.

During these years Motor Products Corporation in forming individual metal parts has employed its great experience to combine the ultimate in beauty and utility.

In addition to the automotive parts identified below, Motor Products Corporation manufactures heavy rolled sections and miscellaneous parts for trucks and structural sections for steel buildings.

★ ***Windshield mouldings*** ★ ***Window ventilators*** ★ ***Garnish mouldings***

★ ***Glove compartment doors***



★ ***Radiator grilles*** ★ ***Instrument panels*** ★ ***Body mouldings***

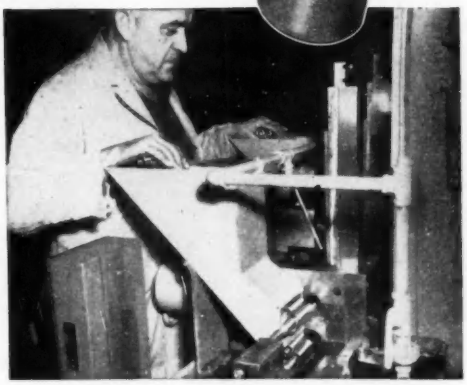
Continuous, Automatic Cycle produces 1150 parts per hour!

TYPICAL EXAMPLE OF HIGH PRODUCTION ENGINEERED THE *American* WAY

To broach radius notches in automotive piston pins, American engineers designed a ***completely automatic*** two station fixture featuring ***continuous cycling.*** Each station broaches two parts. Installed on an American T-4-24 Broaching Machine, equipped with a special work table, this fixture permits broaching four parts simultaneously . . . produces more than 1150 parts per hour.

SIX AUTOMATIC OPERATIONS ENGINEERED IN CONTINUOUS CYCLE FIXTURE

The operator has only to keep the gravity-type loading hopper filled with parts. A transfer pusher pushes two parts at each station into position where they are hydraulically clamped in V nests. The main slide starts down broaching the four parts simultaneously. At the end of the stroke the transfer pushers push the part into a chute in the center of the machine where they are ejected. The transfer pushers and broaches return to the starting position and the cycle repeats. All operations are electrically interlocked.



SOLVE YOUR BROACHING PROBLEMS THE *American* WAY

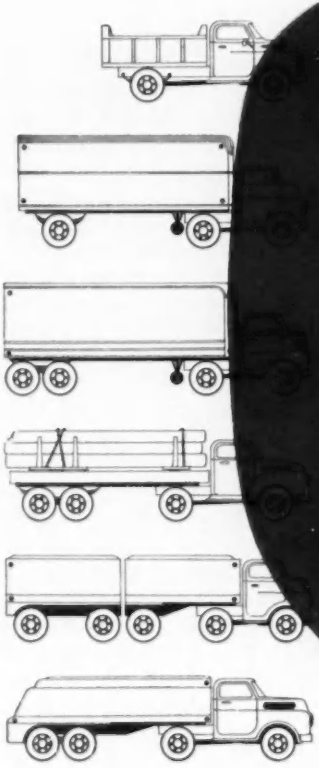
Continuous, automatic cycling is only one way that American engineers help manufacturers get high production. Perhaps an American-engineered installation will increase production in your plant. To get American's recommendations send a part print or sample and hourly requirements.

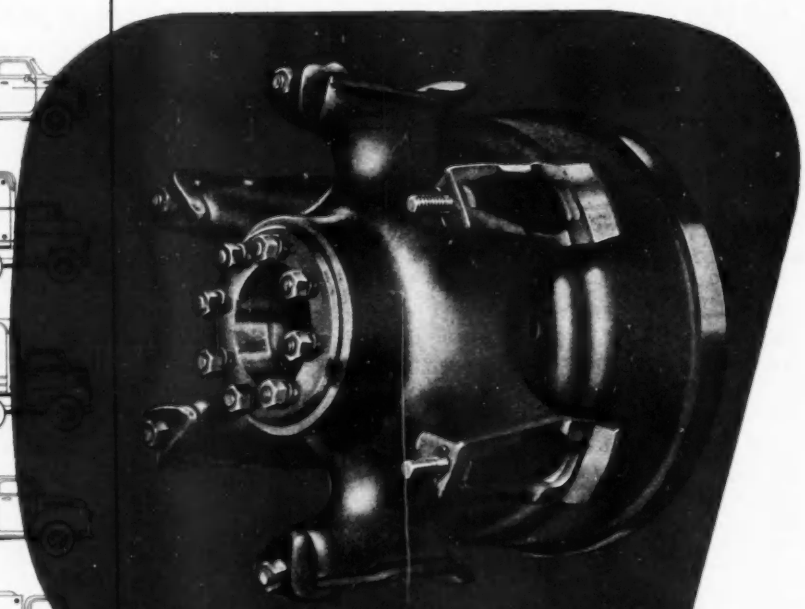
AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

GUNITE WHEELS MAKE GOOD TRUCKS BETTER





GUNITE

CAST-STEEL WHEELS
Offer Both Price and Weight
Advantages to Heavy Truck
and Trailer Manufacturers

ESTABLISHED IN 1904

ROCKFORD ILLINOIS

Many engineers are specifying Gunite Cast-Steel Wheel Assemblies on their heavier trucks and trailers. They gain all these advantages:

1. Minimum weight with maximum strength
2. Better appearance
3. Floating rim bolt for easy replacement
4. Increased safety of famous Gunite Brake Drum
5. Greater air-cooling over brake drums
6. Easier Assembly . . . less weight to handle

Write for Complete Engineering Data

GUNITE FOUNDRIES CORPORATION

Machine tool idea pool

In designing machine tools, as in planning countless other products, OSTUCO Steel Tubing provides an endless pool of practical ideas because of its *unlimited adaptability*. Collets, chucks, spacers, spindles, bearings, shafts, ferrules, and handles are but a few of the applications.

By varying the radius of a bend, the length of a taper, the dimension of an upset, etc., an old design can be improved or a new one created. By combining such operations, a part can be made to serve several functions, thus simplifying design. Parts may even be fabricated or forged beyond recognition as a tube section.

Whether you design machine tools or products of a distinctly different nature, you will want to investigate the many quality-improving, cost-reducing features of OSTUCO Tubing. We cannot always promise early delivery estimates on new civilian orders, because of military demands, but it will pay you to consult our experienced engineers about OSTUCO Tubing when redesigning your products to meet future competition.

Write for informative free booklet, "Fabricating and Forging Steel Tubing," showing the many basic fabricating and forging operations OSTUCO can perform.

THE OHIO SEAMLESS TUBE COMPANY

Manufacturers and Fabricators of Seamless and Electric Welded Steel Tubing

Plant and General Offices: SHELBY, OHIO

OSTUCO SHELBY OHIO

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What's right with this picture?

Chances are you won't find one assembly line turning out both civilian and military trucks.

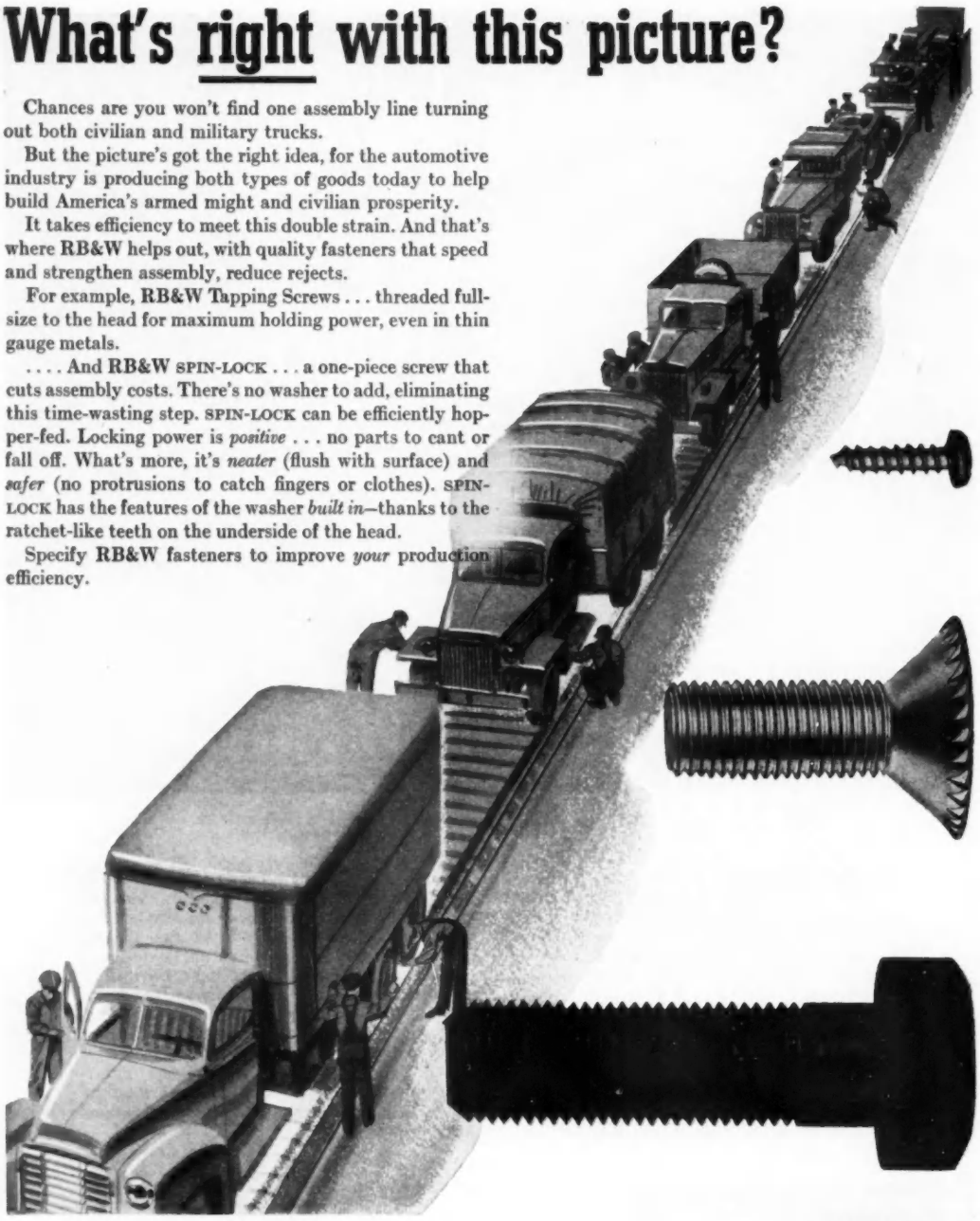
But the picture's got the right idea, for the automotive industry is producing both types of goods today to help build America's armed might and civilian prosperity.

It takes efficiency to meet this double strain. And that's where RB&W helps out, with quality fasteners that speed and strengthen assembly, reduce rejects.

For example, RB&W Tapping Screws . . . threaded full-size to the head for maximum holding power, even in thin gauge metals.

. . . . And RB&W SPIN-LOCK . . . a one-piece screw that cuts assembly costs. There's no washer to add, eliminating this time-wasting step. SPIN-LOCK can be efficiently hopper-fed. Locking power is *positive* . . . no parts to cant or fall off. What's more, it's *neater* (flush with surface) and *safer* (no protrusions to catch fingers or clothes). SPIN-LOCK has the features of the washer *built in*—thanks to the ratchet-like teeth on the underside of the head.

Specify RB&W fasteners to improve *your* production efficiency.



RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Dallas, Oakland. Sales agents at: Portland, Seattle.

RB&W
THE COMPLETE QUALITY LINE

107 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

Again... proved BEST!

Over-all engine wear REDUCED.....78%

Ring wear REDUCED.....33%

in over-the-road tests with

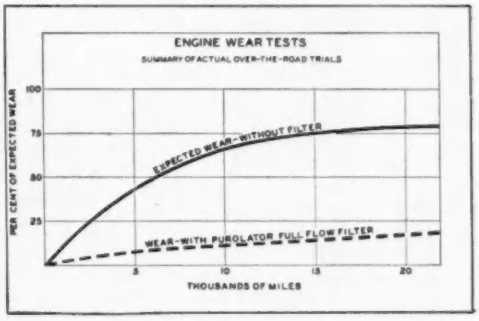
PUROLATOR

FULL-FLOW

MICRONIC FILTERS

In test after test, America's leading automotive and engine manufacturers are proving that Purolator oil filters are the best!

The figures you see above are from engineering records compiled by one of the world's largest makers of passenger cars and trucks. They are the results of gruelling *actual-service* tests made to compare the performance of various makes and types of lube oil filters. And, like so many other important ones, this manufacturer found that Purolator*, *and only Purolator*, oil filters gave them the engine-saving performance they were seeking. They found that Purolator Full-Flow filtration was better by far than *any* partial flow system . . . that the Purolator Micronic* Filter element gave finer filtration, with longer life, at lower pressures than any other tested.



There are sound reasons for the Purolator Micronic Filter Element's outstanding superiority! It is the *only* element capable of delivering full-flow rates during its entire service life, *with dependable filtration down to submicrons* (.0000039 in.)! It has *ten times* the effective filtering area of old-style filters.

If you are a maker or user of internal combustion engines, you are invited to test and *compare* Purolator performance for yourself. Our Engineering Department will gladly co-operate in helping you prove to your own satisfaction *that there is no other oil filter capable of giving you better engine protection than Purolator. Simply write, telling us what equipment you are using.* *Reg. U. S. Pat. Off.

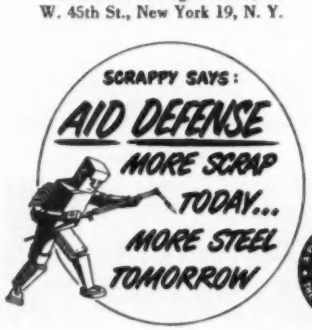
PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices:
Chicago, Detroit, Los Angeles

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

How Can America Produce All the Steel It Needs ... for Military... and Civilian Purposes?

FREE BOOKLET Tells How to Conduct Scrap Salvage Program in *Your* Business.

Address Advertising Council, 25 W. 45th St., New York 19, N. Y.



One way is to feed more pig iron into the furnaces. But . . .

That will require *more* supplies of ore, limestone, coal, etc.*—to say nothing of more new ore boats and rail cars to transport the additional supplies.

A better way—the *only* practical way—is to use the *dormant* iron and steel scrap lying around in the form of old machines, equipment, tools and metal structures.

Your business *must* have available scrap—in *some* form. That scrap is *needed* to keep the furnaces going in the steel mills . . . to keep our fighting forces and our allies well armed . . . to sustain our civilian life at home.

Think how many ways *you* use iron and steel. Think what would happen if it became extremely scarce. Put your iron and steel scrap to good use—now—by selling it to your local scrap dealer.

Don't delay—the emergency is becoming more severe every day.

*For every ton of scrap fed into the furnaces, we save approximately 2 tons of iron ore, 1 ton of coal, nearly ½ ton of limestone and many other critical materials. Also, scrap helps make steel faster, shortens the refining process.

NON-FERROUS SCRAP IS NEEDED, TOO!

This advertisement is a contribution, in the national interest, by

Automotive Industries

Defense

Produce MORE goods at LOWER costs with TRADE Verson MARK presses

A "guns and butter" economy puts more pressure on production than we have ever known short of all out war. But with metal working equipment in short supply, machinery programs must be planned well ahead. If your needs include presses or press brakes, we would like to show you the many recent advancements engineered by Verson to make it possible to produce more goods, more efficiently.

While we are presently operating night and day in an effort to meet the tremendous demand for Verson equipment, our engineers will welcome the opportunity to assist you in your long range planning and show you how modern stamping techniques developed by Verson can help you produce more efficiently.

800 ton Verson Hydraulic press used by Stolper Steel Products Corp., Milwaukee, to form military gasoline cans. (Photo Courtesy Milwaukee Sentinel.)

Originators and Pioneers of Allsteel Stamping Press Construction

VERSON ALLSTEEL PRESS COMPANY

9307 South Kenwood Avenue, Chicago 19, Illinois — So. Lamar at Ledbetter Dr., Dallas 15, Texas

A VERSON PRESS FOR EVERY JOB FROM 60 TONS UP

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING
DIE CUSHIONS • COMPRESSION AND TRANSFER MOLDING PRESSES

Ever since you were knee-high to a hop-toad, you've heard about America's wonderful *natural resources*—the bountiful fertile fields, the towering timber growth, the boundless water power, and the untold wealth of gold, iron, oil, silver, coal and other natural treasures that lie buried in the ground.

Is it because America has *more* natural resources than any other country that Americans enjoy the world's highest standard of living? No—many countries have as much—some have more.

Then is it because Americans *do* more with what they've got?

Yes! And the reason is as plain as the nose on your face. It's because Americans are free to develop their natural resources—and their natural resourcefulness—in the wholesome climate of *open and strenuous COMPETITION.*

COMPETITION—not "regimentation"—is what eggs a man on to do his best.

COMPETITION—not government control—is what urges a business to give its customers ever greater value for their money.

So let's say "NO SALE" to the *ism* peddlers who would have us swap our U. S. A. system of free competition for their "planned" regimentation—trade our U. S. A. freedom and plenty for their serfdom and poverty!

* * *

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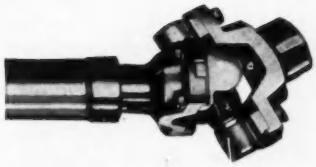
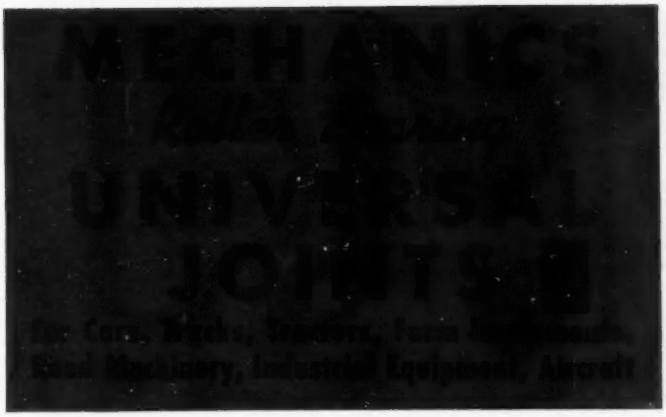
THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER

if excess WEIGHT is your problem

WHY make your trucks haul unnecessary EMPTY WEIGHT poundage that reduces the PAYLOAD part of their legal gross weight? Because the MECHANICS Roller Bearing UNIVERSAL JOINTS truck PROPELLER SHAFT is 28 pounds lighter than other joints and shafts of comparable torque capacity, MECHANICS equipped trucks carry 11,200,000 extra pounds of PAYLOAD during the average truck life of 400,000 miles.





Let our engineers help add to the ton-mile capacity of your trucks by specifying weight-saving MECHANICS Roller Bearing UNIVERSAL JOINTS truck PROPELLER SHAFT applications.

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner

2024 Harrison Ave., Rockford, Ill.

"Our Country's Strength is Created . . ."

REESE H. TAYLOR
President, Union Oil Company of California

"Our country's strength is created by the responsibility and solidarity of individual citizens in a self-chosen government and economy. It can—and must—be perpetuated against all who seek to undermine it. The men and women who invest regularly in United States Defense Bonds are contributing to our national integrity and to the traditions of personal independence so characteristic of a free people."

Every pay day, 6,500,000 employed men and women . . . "are contributing to our national integrity and to the tradition of personal independence . . ." by the systematic purchase of United States Defense Bonds.

How important is this contribution to national economy and personal security? Let's look at a few figures.

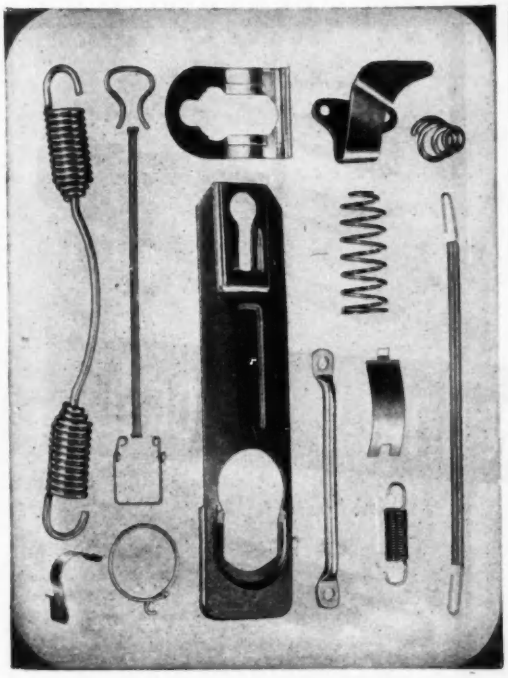
- the cumulative purchases of 6,500,000 Payroll Savers add up to $130,000,000 per month.
- the number of individual E Bonds sold in 1951 totaled 68,069,000 pieces—8% more than in 1950.
- purchases of $25 and $50 E Bonds—the denominations popular with Payroll Savers—were greater than the sales of $500 and $1,000 E Bonds.
- monthly redemptions of unmatured E Bonds during each of 9 months (April to December, 1951) were less than 1% of the amounts outstanding.
- the *cash value* of Series E Bonds held by individuals on December 31, 1951, amounted to $34,727,000,000—$4.8 billions more than the cash value of Series E's outstanding in August, 1945.

That Americans have built personal security and a reservoir of purchasing power exceeding $34.7 billions is due in no small measure to the patriotism and foresight of men like Mr. Taylor and other leaders of industry who have made the Payroll Savings Plan available to their employees.

For help with your Payroll Savings Plan, phone, wire or write to Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D. C.

The U.S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

AUTOMOTIVE INDUSTRIES



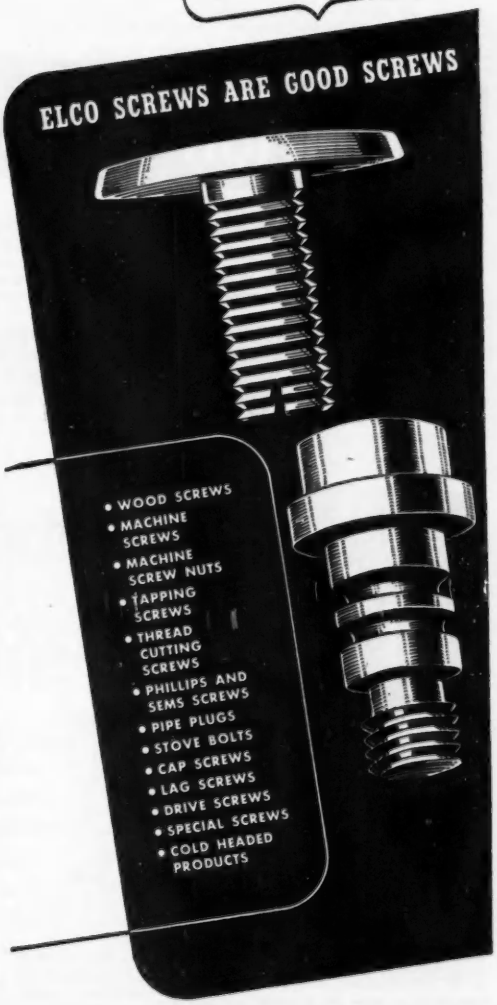
● When a spring is doing its job efficiently, dependably, there's little cause for worry. That's the kind of a spring we can make for you. U. S. Steel Wire Spring craftsmen turn out springs and small parts that are engineered to give your product a long record of trouble-free service. You can eliminate spring worries today with a call or letter!

Producing Clutch Pressure Springs
. . . Clutch Dampener Plate Springs

No order too large or too small

The U. S. STEEL WIRE SPRING Co.
7800 FINNEY AVE. • MICHIGAN 1-6315
CLEVELAND 5, OHIO

ELCO SCREWS



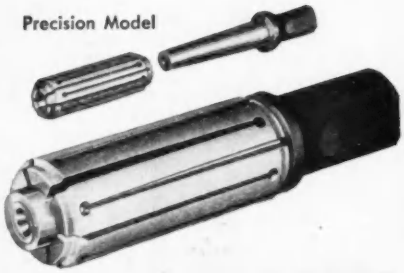
ELCO TOOL AND SCREW CORPORATION
1914 BROADWAY • ROCKFORD, ILLINOIS

Work savers-cost cutters job speeders-in any shop

Save time spent tooling up solid mandrels. CHAMPION mandrels automatically expand to exact, positive, concentric fit as the flexible sleeve is moved along the tapered arbor. Work quickly set up; easily taken down. Production costs cut, whether the job calls for machining only one piece or ten thousand pieces.

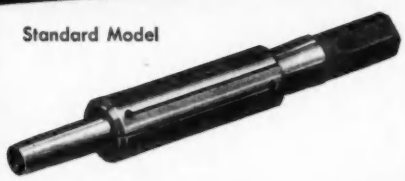
Precision Model positively guaranteed for precision grinding, turning and milling operations. Ideal where accuracy and time-saving are of utmost importance. Available in standard sizes from ½" through 3" diameter, graduated by 1/16". Arbor built for heavy loads. Sleeve has range of .010", from .003" under to .007" over nominal size. Positive stop at maximum size prevents overstrain. Holds tolerances of .0002" run out. Withstands hardest wear; permanent accuracy is assured.

Precision Model



CHAMPION E-X-P-A-N-D-I-N-G MANDRELS

Standard Model



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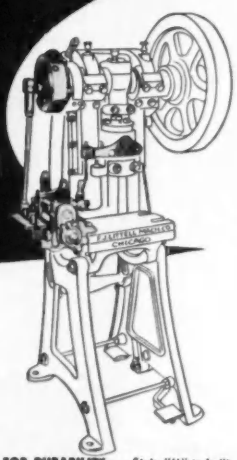

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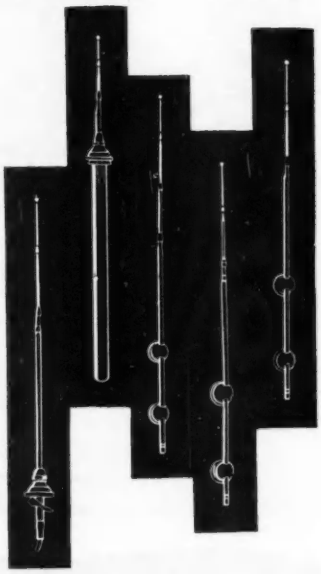

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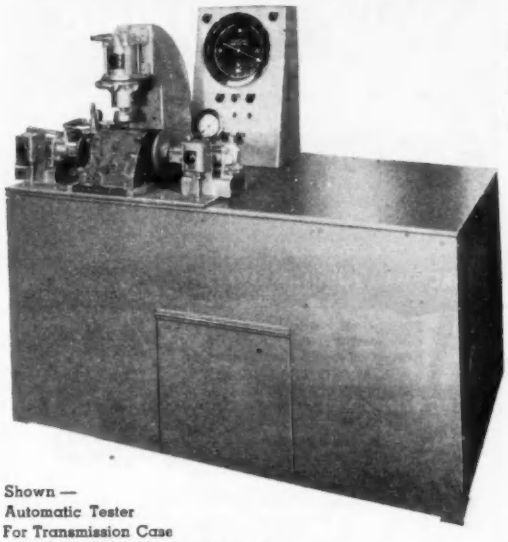

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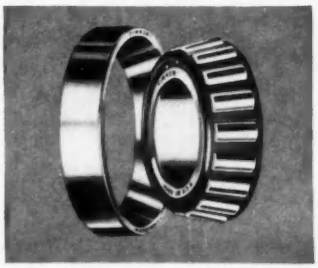

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